The FitzPatrick Lectures

ON

GREEK MEDICINE IN ROME.

DELIVERED AT THE ROYAL COLLEGE OF PHYSICIANS OF LONDON,

BY

SIR T. CLIFFORD ALLBUTT, K.C.B., M.D., F.R.S.,
REGIUS PROFESSOR OF PHYSIC IN THE UNIVERSITY OF CAMBRIDGE.

LECTURE II.

PRESIDENT AND FELLOWS,—My last lecture* ended with an allusion to the poison lore of the ancients, a literature in itself; with an allusion therefore I had to be content, for time presses, and we must turn to other and less sinister subjects. And none in this period is of greater historical interest than the pulse doctrines.

Pulse Doctrine.—Broadbent, in the introductory chapter of his treatise on the pulse, set forth the Galenic doctrines sufficiently for his own purpose; but on this occasion we may fitly endeavour to trace more fully and particularly the researches on the circulation of the blood from more ancient times, from Praxagoras of Cos, in the succession of Diocles, through Athenaeus down to Galen, to whom we are chiefly indebted for what we know of the subject. That to feel the pulse was a common practice we note incidentally in such comparatively early passages:

> Tange, miser, venas,
> . . . nil calet hic.
> (Pers., *Sat.* IV.)

and *Et peragit soliti vena tenoris iter* (Ovid in Letter X. to Flaccus, speaking of cold and languor without fever). Galen wrote many essays on the pulse, and from his fourth, fifth, eighth, ninth, and nineteenth books, in which he gives a summary and a criticism of the various pulse doctrines from Herophilus to Archigenes, especially in the Περὶ τῶν σφυγμῶν and the Περὶ διαφορᾶς τῶν σφυγμῶν (IVth Book); and from some other sources, as in a certain pseudo-Galenic pneumatist treatise, from a pseudo-Soranic tract published by Rose (Anecdota Gr. II), and especially from the treatise on the pulse usually attributed to Rufus of Ephesus, a fairly definite reconstruction of the pulse-lore of the ancients has been attained. Galen's main source was a lost treatise—Περὶ σφυγμῶν—of Archigenes,† some fragments of which he quotes; though the first treatise on the pulse (Περὶ παλμῶν) was written by Aegimius of Elis, of the period of Hippocrates. But I may take Praxagoras as the first physician to give the pulse its due place in diagnosis and therapeutics. Unluckily Praxagoras taught that the arteries were air channels only, a dogma which provoked grievous dissensions, errors, and abuses through later ages. It would seem that Chrysippus also had emphasized the value of the pulse as a criterion of fever.

In the next place, we come to Erasistratus, who described the valves of the heart, the chordae tendineae, and the several regions of the arteries and veins in heart and liver more accurately than Herophilus, whose attention was directed rather to the anatomy of the brain. Erasistratus showed by experiments that the arteries contained blood, and he recognized the function of the heart as the prime mover of the circulation. This great master got very near the truth of the circulation—to a point of view too soon to be perverted by pneumatist and other notions for which he himself was not altogether without responsibility; or indeed to be lost sight of in that empirical indifference to anatomy to which I have referred. This insight of Erasistratus (c. 340–324 B.C.) is of much historical importance; for, as we have seen in respect of Praxagoras, before his time the arteries during life were supposed to contain air only—thin air, breath, vapour, spirit, pneuma. It is well, therefore, to quote the very words attributed by Galen (V, 552) to Erasistratus, which are as follows: ἅμα μὲν ἀρχὴν καὶ ἀρτηριῶν καὶ φλεβῶν εἶναι τὴν καρδιάν, ἅμα δε τοὺς ἔξωθεν ἔσω νεύοντας ὑμένας ἐπὶ τοὺς εἰσάγουσι τὰς ὕλας ἀγγείας ἐπιπεφυκέναι, φάσκοντος. This Galen repudiated, for how, said he, could the veins originate in the heart when the blood for them is made in the liver? The remarkable hypothesis by which Erasistratus endeavoured to reconcile the new and the old notions of the arterial contents was that at certain undefined places in the circulatory tree there were communications—anastomoses—between the veins and the arteries: channels which under ordinary circumstances he seems to have assumed to be closed or but sparingly permeable, but in case of lesion or disease opened, so that the blood streamed into the arteries (παρέμπτωσις) and became one of the causes of fever. To this hypothesis in respect to haemorrhage we shall return, for certain therapeutical means were founded upon it.

Yet strangely enough, both as regards the physiology of the circulation, and in medicine also, the Erasistrateans paid less attention to the pulse than did the Herophileans, perhaps because of their reluctance to bleed. In their clinical appreciations Herophilus and his immediate disciples seem to have been properly content with four excellent indications of the pulse—namely, size, strength, rate, and rhythm; but the later disciples of his school too sedulously and fancifully overargued its signs, splitting them into a multitude of unreal categories. Archigenes, of whose elaborate treatise, under the title of Περὶ σφυγμῶν, Rufus gives some account, and of which some excerpts have survived, in his recognition of eight categories only "as generally known," was economical. However, his modest eight, it would seem, we must make into ten; for on turning to Daremberg's Rufus, we find that "hard and soft," as qualities of "systasis and dialysis," are to be distinguished from "strong and weak," as qualities of tone. These eight, or ten, categories (λόγοι) Galen appears, from his two works on the pulse and a certain pseudo-Galenic chapter, to have adopted (Wellmann). These and other minutiæ, such as pulses hot or cold, dry or moist, etc., if in themselves idle or absurd, are nevertheless serviceable as clews to traditions and authenticities.

When from such records as remain we endeavour to reconstruct the pulse and respiration doctrine of the Pneumatists in the time of Athenaeus—say in the reign of Claudius—they seem to have been after this form. The pneuma, divine energy, or world-soul, permeated the body as πνεῦμα ζωτικόν; but, as Erasistratus taught, it reached the heart by respiration through the lungs as πνεῦμα ζωτικόν and πνεῦμα ψυχικόν; whence the πνεῦμα ζωτικόν "sped like a bird" through the arteries and the body, while the πνεῦμα ψυχικόν was delivered to the brain (Chrysippus). Now as the pneuma reached the heart it met with the blood, both in the arteries, which had their roots in heart, and in the ventricles; but in the ventricles grosser blood was in excess, in the arteries pneuma. "The arterial blood was thinner, purer, and redder." It seems at this time to have been generally held, in spite of Erasistratus, that the veins had their roots in the liver.‡ The movements of the circulation, systole and diastole, were kept up by the innate heat, identified by the pneumatists with the pneuma, as a single entity; and the harmonious rhythm of these motions was a sign of health. Thus the Praxagorean notion, that the arteries contained pneuma only, appears for the time to have been definitely set aside; though in comparing these records we are often perplexed by equivocal terms. Aristotle seems to have been unaware of the distinctions of Praxagoras between arteries and veins, except in respect of the aorta and venae cavae; and he supposed the heart to consist of but three chambers. Especially in this respect we are perplexed in Aristotle, and elsewhere, by the uncertain meaning of the word φλέβς, or *vena*, although Herophilus and Erasistratus clearly distinguished arteries from veins, and the left from the right heart. Celsus, whose testimony in respect of Alexandria is very important, uses *vena* to signify blood vessels (including arteries); yet he uses the word

* Lecture I was published in the BRITISH MEDICAL JOURNAL of November 5th, 1910, p. 1393.

† For these paragraphs I am again indebted to Wellmann in his *Pneumatists* and in Susemihl; to Daremberg's *Rufus;* to Celsus himself; to the relics of Archigenes, etc.; and to various commentators on Aristotle and the later sources.

‡ It is worth notice that the Chinese to this day, I am told, think that the right pulse tells the state of the liver, the left the state of the heart.

"*arteriae*" also, on the whole with a definite meaning, a n atomically in our sense—as, for example, "itemque arteriae quas *καρώτιδες* vocant" (IV, 2); though we observe that with them he classes that main pneumatic channel the *aspera arteria*, or windpipe. And here I may conveniently anticipate matters so far as to say that Galen must have accepted the truth that the arteries contained a redder and more ethereal blood;* for, as we all know, he assumed the existence of pores in the ventricular septum. He was also aware that the heart was the centre and source of the pulsations, and showed experimentally that if an artery were ligatured—the femoral, for instance—pulsation continued between the ligature and the heart, but ceased beyond it; an observation, however, which, if taken alone, would not have satisfied those pneumatists who attributed pulsation to the throbbing of the pneuma only, an idea which may now occupy our closer attention. With Galen the difficulty was to understand how Nature, "which does nothing in vain," came to make two different kinds of vessel for the carriage of the blood.

It seems to me, then, rather difficult in the obscurity of the traditions to discriminate between the great Alexandrians as concerns their anatomical and physiological views respectively, or, indeed, to compare them with precision, though it is clear that in the clinical observation of the pulse the Herophileans were distinctly in advance; but it is probable that not Herophilus only, but also the contemporary Alexandrian school generally, attributed the energy of the arterial pulsation to the heart as the chief seat of the animal pneuma, or innate heat. Moreover, herein they certainly established the important conception of the heart and blood vessels as an integer, or functional unity, a conception in later times too often forgotten. The pulsation itself they divided into four periods—a contraction, an expansion, and two pauses. Whether both these motions or only one of them used energy seems to have been a point of some disagreement, though as the distinction between cardiac and arterial systole is often obscure, and is not always made quite clear even by Wellmann, it is not quite easy to be sure of the grounds of this dissent. However, to start with, we ascertain from a passage in the 8th volume of Galen (755) that, although in the Herophilean opinion (Susemihl) the systole only used energy, the diastole being mere recoil, according to the later (Roman) school of Athenaeus energy was expended both in systole and in the diastole. The passage being an important one I quote it in the original: "*ὁι δ' ἀπ' Ἀθηνάιου πάντες, ὡς εἴρηται, τὰς κινήσεις ἀμφοτέρας ἐνεργέιας ἡγοῦνται, τήν τε ἐν τῷ διαστέλλεσθαι γινομένην καὶ τὴν ἐν τῷ συντέλλεσθαι.*

Now in some sentences it appears to me that, contrary to our customary use, by systole was intended the lift of the artery, whereas in others, as where it is disputed whether the systole of the pulse can be felt or not, clearly the arterial fall was intended. Moreover, it has been pointed out I think already, on a suggestion of the late Professor Magnus, that many of these writers, at any rate, supposed the heart and the arteries to swell and collapse together; this I had myself observed and illustrated by the following passage: "*διογκωσις καὶ συνίζησις αἰσθητὴ καρδιάς καὶ τῶν ὁμοιοπαθούντων αὐτῇ.*" Dicroty, as we gather from Galen, was regarded as a second weaker beat; an explanation which he accepts, comparing it to the second tap of the hammer on the anvil, the anvil being the *σκληρότης* (inertia) of the arterial wall (*σῶμα*).

The Roman pneumatists, even of the ability of Archigenes, hampered as in part they were by the methodist abstractions of *strictum* and *laxum*, lost sight of some invaluable clinical inferences from qualities of the pulse, which had been perceived by the Alexandrians, and which Galen restored. For instance, these later pneumatists—as we find in Athenaeus, Agathinus, Herodotus, and Archigenes—got entangled in argument between blood content and pneuma content; and between tone (*τόνος*) as pneuma, and tone as a quality of the arterial wall (*κατὰ τὸ σῶμα τῆς ἀρτηρίας*). In such fragments of Archigenes as we possess (Wellmann) we find this confusion between blood content, pneuma content, and arterial wall. And I may note here, a little before due time, that, so far as I know, Galen was the first to point out that the arterial wall is liable to sclerotic degeneration. So, if we try to get behind these confusions, we shall apprehend that the Alexandrians, nurtured in a more scientific school, had, in respect of the circulation, perceived certain most important truths afterwards obscured, and that to these forerunners Galen owed not a little, how much we cannot now tell. I may add further this notable instance, that in respect of plethora the difference was then discerned between a long (or sustained) and a short beat as definitely contrasted with degrees of frequency of beat; and again between the "broad" (*πλατὺς*) pulse—as of a relaxed artery with large output—and an ill-filled pulse. The high pulse (*celer*) of the former case was also described by them; so that they regarded the big pulse (*μέγας*) in three dimensions.

In systole the pneumatists considered that air (pneuma) was drawn in, and in diastole the fuliginous excrement expelled; thus they forwarded the scientific conception of diseases as perversions of the normal. It was especially true of Erasistratus that he fully grasped this idea, only too soon to be vitiated, that disease is a perversion of health, of the normal processes; not a condition contrary or foreign to biological nature. To take a very interesting example: to those of my readers who are conversant with music the name of Aristoxenus of Tarentum, a pupil of Aristotle, is not unfamiliar, as of one who conceived, or on behalf of his musical tutor recorded, a masterly contribution to the theory of music. Now, Aristoxenus flourished in the fourth century just before Herophilus; and it is interesting to find that in his description of the rhythm and arrhythms of the heart Herophilus used the terms of Aristoxenus. For example, in illustration of the idea of morbid as but deviations from normal processes, Herophilus distinguished certain cardiac rhythms as characteristic of periods of life. The rhythm of infancy, he said, was a pyrrhic (∪ ∪); of adolescence a trochee (– ∪); of middle life a spondee (– –); of age an iambus (∪ –). I am not now concerned to justify these descriptions precisely, but to present them as patterns of method, and of a sound kind of pathology. After him Archigenes likewise described and compared taxic and ataxic pulses—gallop rhythms, palpitations ("spasms") of the pulse and the like—as various degrees of deflexion from the normal into the abnormal. This fruitful conception of the nature of disease unfortunately became distorted by demonology with its magical cures; and also by the kindred if more spectral hunt of the metaphysicians after "morbid entities," a cry which finds an echo in the words of some eminent physicians even of to-day.

After the pulse lore of these schools, I would make some reference to their doctrines on *sexual generation*; for herein also we revere the memory of our immortal Harvey. And when, in comparing his results in this field with those on the physiology of the circulation, we dare to reflect that, as in the times of which we are speaking, even supreme genius cannot penetrate far beyond the limits of contemporary knowledge and means of research, we cast no shadow on that great memory. The problem of generation, as it presented itself to the ancients, is too difficult to put succinctly without a renunciation of much of its detail and of the history of many tides of opinion. Moreover, to make the argument comprehensible, I cannot quite confine myself to the pneumatists; I must make some more general reflections upon its phases from Hippocrates through Aristotle to Galen, that I may indicate the stage where the pneumatists came in. Our sources in this respect are, however, very scanty, and turn chiefly upon what is recorded in Galen's *Περὶ σπέρματος* (IV. 593).

Concerning the respective virtues of male and female in the generation and development of the embryo, the opinion of Hippocrates is clear—that the ovaries corresponded to the testes, and that male and female both contributed seed. The superb anatomy of Vesalius left this physiological notion of the matter unaltered until the seventeenth century, when it was undermined by the labour of Highmore, Stenson, and de Graaf. After Hippocrates we come to the opinions of Aristotle, which are too well known to need a careful description here. Suffice it to say that this great sage firmly and consistently denied that the female contributed seed; the semen, the finest concoction of the male blood, as a dynamic element (*τὸ ἄρρεν ποιητικὸν*) quickened the

* We know that Galen wrote an essay entitled *Εἰ κατὰ φύσιν ἐν ἀρτηριάις αἷμα περιεχέται.*

passive but plastic female element (τὸ θῆλυ παθητικόν),* enduing it with "form." He saw no difficulty in the resemblance to the mother; for did not plants vary with the soils in which they might be planted? He admitted that in the catamenia the female contributed some kind of generative substance (γόνη), but contrasting it with σπέρμα, held that it was but of a rudimentary kind. His objection against the seminal contribution of the female—that she could be impregnated without orgasm, and even unconsciously—was less adequate; and how often are we tempted to think how happily we could have jogged the elbow of a great scientific father and supplied him with just the notion he needed. For Aristotle had a good knowledge of the egg, and how well the ovum would have fulfilled his argument,† as Fabricius and Harvey perceived and von Baer finally proved. Straton, so far as we can tell, seems not to have followed Aristotle's footsteps closely; he dwells more, as did some other authors, on prepotency, and assumes that in particular cases the prepotency might have lain with the male or the female. Next we come to Alexandria and to Herophilus, who described the ovaries (διδυμοι), and the tubes (σπερματοκοὶ πόροι); but this more accurate anatomy did not reveal more physiology. So far as it went, indeed, it seemed in favour of seed in both sexes; but the Aristotelians, magnifying the content of the σπέρμα, fancied that these female parts were but a "structural harmony," after the kind of the male mamma. It is notable that Falloppius, himself a master in this field of anatomy, and pursuing the same positive methods as Herophilus, scrutinized the ovaries and vesicles minutely in search of a seminal element, and, finding none, also denied seed to the female. And we may suppose that Harvey, in holding the same opinion and denying that the ovaries, to which he attributed a rather fantastic function, were an equivalent of the testes, followed Falloppius. But to come to the pneumatists: Athenaeus, and Archigenes who followed him, seem to have been the last physicians of the period to rely upon Aristotle; they denied seed to the female, and Athenaeus seems to me to be even more dogmatic about it than Aristotle himself. Galen, however, definitely did attribute dynamic seed to both female and male. The old demur that the progeny were as prone to resemble the mother as the father, for Galen held no difficulty; he assumed that each sex afforded a seed endowed with both virtue and substance (δύναμις and ὕλη); and yet he betrays a curious uneasiness about it, for how is it, he candidly asks himself, that the female never conceives alone? As to the preparation of semen as a perfected product of the blood, in this respect Aristotle seems to have followed Democritus, Hippocrates, and Praxagoras in a speculation which reminds us of Darwin's idea of pangenesis; in the pneumatico-stoic opinion, however, the semen was sublimated from the hegemonic spirit in the heart.

Influence of Pneumatism on Medicine.

Of this kind, then, so far as these limits permit me to unfold it, was the doctrine of the pneuma, a metaphysical idea foreshadowing vital combustion. And pneuma, whether under this name or in refluent waves of aboriginal ideas under such names as the vegetable and animal souls, of the Archaeus, of van Helmont's vital principles of the animal spirits of Descartes, of the motor nervous fluid of Stensen, of the animism which in the early eighteenth century sprang from chemistry, of the vitalism again which sprang from the doctrine of irritability, or of the transcendent vital quality beyond physico-chemical virtues entertained by some leading physiologists to-day—πολλῶν ὀνομάτων μόρφη μία—must, in so far as it is an imported entity, make a free pathology and an inductive therapeutics almost impossible. And meanwhile the humoral pathology had to be counted with, even by the pneumatists. If the pneuma might become hot and dry as in fever, cold and moist as in dropsy, too dense or too light with many consequences; or again, too quick or too sluggish: if it might be pent up, as in epilepsy and constipation, or, as in hysteria, imprisoned in the womb, so again the humours also might be crossed, or crossing, in one or more of the many possible permutations of dyscrasia. The Hippocratean doctrine was that health and disease depended upon the crases of qualities. That health consisted in a eucrasia was, it is said, an axiom of that spectral sage Alcmaeon of Croton; and the conception of diseases as modes of the many possible dyscrasias survived down to Galen, and, by him regenerated, flourished as we know in a crude form through the Middle Ages; and in a sublimated form has yet a great part to play in pathology. These humoral doctrines the pneumatists did not abolish, but made their intricacies still more complicated, coiling them into a mesh which at present we have no leisure to unravel; curious as is the study of an intense mental hunger, with but a scanty harvest of knowledge, feeding upon itself. And not only in the first and second century A.D. in medicine, in Neoplatonism, and in the Christian Fathers, but again in the thirteenth century, and in the ingenious literature of the sixteenth and seventeenth century against which Sydenham led so masterly a revolt, we see history thus in principle repeating herself. It was well, therefore, that the empirical reaction initiated in the earlier Alexandria by Philinus the Coan and Serapion, narrow and ungenial as they seemed, and, more fruitfully and scientifically, the admirable surgery of the age curbed the extravagance of the pneumatic and other metaphysical opinions; and this protest it was which made the pneumatist sect strictly so-called, although backed by the Stoics, but a transient phase.‡ Indeed, its own greater men, almost from the first, had begun to hedge by a prudent eclecticism. And it is true that their central doctrine of the pneuma was less prejudicial to surgical progress, which they forwarded upon Alexandrian anatomy, than were their unbridled expatiations, a wasted or even a mischievous energy, in the field of inner medicine. That the pneumatist emphasized the dynamic side of physiology is true also; and that, like the methodist, he recalled attention to the solids of the body; yet, by personifying the pneuma as an indwelling and creative entity, he provoked a reduction of the functions of growth, work, and excretion to a passive machinery worked by a demiurgical finger: thus the whole framework of digestion, for example, became for him a mere gizzard, a mill for mechanical contrition of food; and therapeutics became a magical checkmate of the malignant. Now the methodist, or at any rate the Lucretian atomist, before the formalist Themison, while animated no less by the dynamic idea, had regarded energy more truly as one aspect of a quick matter than as the demonic master and manipulator of an engine. And the sceptics of the day, on narrower if surer ground, were teaching, almost with the decision of Locke, that thought can only be built upon the functions of the senses. Even for Diogenes of Apollonia§ phenomena, the pneuma having condensed into them, were but phenomena, not outside realities; and concepts therefore were fashioned wholly of the products of our senses. The defect of these critical schools, at any rate of the empirics who did not realize that we see what we are trained to see, was, as I have explained, an intolerance even of the chaster Hippocratean reasoning on causes, and a repudiation of anatomy which reminds us of Sydenham's aversion from pathology. Difficult as it is, then, to define our distinctions between the later Herophileans and Erasistrateans, or even to contrast the persons and doctrines of the two great leaders, yet it would seem from the course of events, and from Galen's testimony, that on the whole

* It is usually supposed that Aristotle took the σπέρμα to imply the body of the fetus; he seems to have given too much content to the σπέρμα, but "form" is far from signifying structure. As we gather from the Eumenides, concerning the appeal for the acquittal of Orestes, the idea of deposit of the embryo by the male to be nourished by the female, as in a nest, was far older than Aristotle, and contains far more than "form." But we must remember that in early times the differentiation of notions to which we are accustomed had not been accomplished.

† See the eighteenth chapter of the *De Generatione Animalium*; and also the *De Anima*. After these lines were written I read in the British Medical Journal (August 13th, 1910) a very able and interesting article, signed "J. W. B.," on Dante's knowledge of Aristotle's *De Generatione*, and noted that in Dante's words we might observe a strong infusion of the pneumatic doctrine. I venture, however, with great respect to question if Dante's account of the accretion or supervention of the animal upon the plant soul can be interpreted as a "flash of insight" into our modern idea of the embryo "climbing up its own genealogical tree." His phrases seem to me to contain no more than we meet with not infrequently in ancient and medieval speculation, and we must beware of importing into them concepts of our own.

‡ I venture to repeat that Gomperz has liberally insisted that, whatsoever the inconsistencies within the faculty itself, this service for a more positive method and influence was one for which ancient philosophers were indebted above all to Medicine.

§ Cf. Krause, loc. cit.)

Herophilus had more of the utilitarian bent, while Erasistratus was of a more speculative temper; for Galen accuses him and his followers of scoffing at the clinical school of Hippocrates in a manner which Galen regarded as unmannerly and cavilling. But probably, as I remarked last year, Erasistratus also scoffed not so much at Moses as at the Mosaic dogmatics; while for Herophilus Haeser vindicates some balance of observation and reasoning, some use of theoretical explanations. Celsus, in his invaluable preface, while attributing to Erasistratus also some measure of the empirical temper, says again of this point of view that, although basing its practice upon the more manifest of them—upon the *causas evidentes*—it did not refuse to consider obscure and remote causes: *causis obscuris omnibus, non a cogitatione artificis, sed ab ipsa arte rejectis.* So Jack Wilkes "was never a Wilkite." It would appear notwithstanding that the concentration of Herophilus upon present symptoms—such as the pulse for instance, on immediate or at any rate proximate causes, and, in common with his great contemporary, upon anatomy both normal and morbid, established a pragmatic bent which in the practice of his disciples, if not in his own, led to over-busy interference, to much drugging, and to excess of venesection; while the Erasistrateans, as reflected in their disciple Asclepiades, reasoning upon wider and remoter causes also, and becoming sceptical of therapeutical prowess, pursued a more expectant method. That accordingly Herophilus abode in the four humours, while Erasistratus discarded or neglected them, if in part it explains the antagonism of Galen to the Erasistrateans, still carries with it more history than this. For if the humoral doctrine involved its disciples in a mess of pharmacy from which the Erasistrateans won their freedom, yet on the other hand it would seem it was this inclination from the juices towards a dynamic or pneumatist conception which gave countenance to the opinion of Praxagoras, conveyed by Straton, that the arteries contained air rather than blood—an error of momentous consequence. What Galen did afterwards was to force both empirics and methodists back to study anatomy, to scrutinize causation only too meticulously, and to restore and develop the elemento-humoral tradition; while in his physiology, under the guises of the psychical soul and of a divine teleology, he perpetuated some pneumatism. Thus, while phlegm was interpreted as moist, yellow bile as hot, black bile as earthy, upon these were worked in the three entities of the soul, the animal soul having its primary reception in the pulmonary veins. A great part of our difficulty in distributing these sources and phases of opinions lies in what was Galen's own misfortune likewise—that, rich as by tradition may have been his physiological and clinical inheritance, he, like ourselves, was deprived of historical sources; for even in his day the destruction of manuscripts—as, for one instance, in the siege of Alexandria by Cæsar—had been already disastrous. We know that in the time of Galen, and probably of Celsus also, the works of Erasistratus had perished; and still more unhappily certain histories of medicine under the names of Hermippus of Smyrna (Περὶ ἐνδόξων ἰατρῶν), Andreas of Karystus, and of Histomachus were lost (Haeser). No insubstantial deliverance of medical tradition was notwithstanding handed down to the third century, if in a more impalpable form than of parchment, through Asclepiades, Themison, Archigenes, and many others over whom oblivion has cast her poppy;* and above all things the Hippocratic series of manuscripts had been preserved in other libraries.†

The brilliant progress of Alexandrian anatomy would in itself suggest that in morbid anatomy also advance was not wanting; although, in the early destruction of the records, and under the overgrowth of the later metaphysical cobwebs, much of it fell into oblivion. But that necropsies were then made for the investigation of disease is well known. For instance, a statement of Erasistratus has survived that in some cases of dropsy the liver was condensed, and as hard as a stone. In Alexandria pathological dissections were probably obtained without difficulty; in Rome the current prejudice against them was prohibitive, and so persisted even into the fifteenth century, when the Florentine, Antony Benivieni—the friend of Ficino and Poliziano—made it yield to his ardent importunities.

HYGIENE.

The hygienic and therapeutical doctrines of the pneumatists, and of the eclectic or "episynthetic" physicians who assimilated the more effective results of methodist, empirical, and other schools of the period, were of considerable interest and importance. The surgery of the school especially was excellent, and it is a matter of grave regret that of its records but little is extant. If in the light of recent researches our standard histories of the surgery of this period need revision on some points, yet on the whole it has been set forth almost as fully as the materials permit, so that I will not now dwell upon it. I will turn rather to the hygiene of the period, as of peculiar interest to us who at this moment are occupied with the medical aspect of education, to note the close attention this branch of the public service had received from the Greek physicians in Rome. Celsus, from the point of view of a Roman gentleman, gave some excellent hints on this subject; and the following interesting fragment of Athenaeus is preserved in Oribasius (III, 164): "*χρήσιμον δε ἦ μᾶλλον ἀναγκαῖον πᾶσιν ἀνθρώποις ἀπὸ ταύτης τῆς ἡλικίας ἅμα τοῖς ἄλλοις μαθήμασι συμπαραλαμβάνειν καὶ τὴν ἰατρικήν, καὶ κατακούειν τὸν ταύτης λόγον, ἵνα καλοὶ καὶ ἀγαθοὶ σύμβουλοι γενώνται πολλάκις ἑαυτοῖς τῶν εἰς σωτηρίαν χρησιμόν.*" For Athenaeus indeed medicine was even more than this, it was an integral part of a liberal education.

On airs—as of day and night, of hills and valleys, lunar and solar seasons, and of various climates—the pneumatists, as we should anticipate, laid great stress. Accordingly we find such airs described as moist or dry, hot or cold, dense or thin. Night air was cold and thick, and consequently apt to cause rheumatism, fever, and inflammation. I need not stay to interpret the warning that, of seasons, the air of autumn was the most dangerous; and that during these months one should never sleep out of doors. The air of towns was warm and thick, so that natives of towns were fat, and were sluggish in their secretions. The air of enclosed valleys was bad; and likewise the air of river flats and of marshy places. Inland air was said to be more wholesome than that of the seaside, an opinion derived perhaps from the malarious infection of estuaries, and of harbours, such as Ostia. Drinking water was to be filtered through porous stone or earth, but particularly to remove dirt and leeches.

Diels draws attention also to their careful adaptation of hygienic rules to the periods of the individual life. Still depending chiefly upon the reports of Oribasius and Aetius, which as regards Athenaeus, Agathinus, and Herodotus‡ are fortunately copious, we find that the pneumatists regarded its course as of four stages—of infancy, of adolescence, of middle age, and of old age. We shall note with particular interest that they discouraged all serious school work before the age of 6 or 7; then the child was to be taken in hand by a mild and kindly master, who would discipline the child by changes of work and play, carefully avoiding prolonged stress of either but encouraging him by emulation, finding for him a delight in learning, and remembering that severity or satiety engenders an aversion which in after-life may never be overcome. From the age of 12, however, the work was made tougher, and the pupil led to feel his powers, and to put them forth in such studies as grammar. The master was to be well versed not only in intellectual matters but also in dietetics, in the wide range of exercises known as gymnastic, in the use of the bath, and particularly in the apportionment of the hours of sleep. Thus, as the boy grew up, bodily and mental development went hand in hand; and in adolescence, in order that every man should understand the conditions and promotions of a normal life, medicine and philosophy were introduced into the

* The reader will remember that the treatise of Celsus was either little known to the physicians of Rome in later generations, or was disregarded by them as the compilation of a Roman layman.

† As on Aristotle and Plato in philosophy, so in medicine transcripts and commentaries on "Hippocrates" formed the backbone of the tradition. Cicero refers to the writings of Hippocrates as well known. Galen, besides his other reverential services to the father of medicine, wrote, or proposed to write, a critical essay on the genuine and false treatises of the collection. If it was ever completed it is lost; but Mewaldt in an essay in Hermes (1909) studies some relics of it. The greater empirics, such as Xeuxis and Heracleides of Tarentum, were loyally devoted to the great master.

‡ As, for instance, Orib, III, 107, "*ἐκ τοῦ Αθηναίου.*" For the ready reference to these passages and comments upon them I am indebted again to Wellmann (loc. cit.).

curriculum. Concupiscence was subdued in youth by gymnastics, and by the general discipline of mind and body. In maturity the generative function was to be approached with due sense of responsibility, and directions were given for the *παρασκευὴ πρὸς τὸ παιδοποιίαν*. The sage counsel was given not to forget even in youth the prospect of old age, and, as years wore on, to economize the efforts of body and mind, and to cut down the quantities of food; indeed, at all ages the food was to be reduced in warm weather. And with the exquisite Greek sense of balance, even in physiology, and of the unity of bodily and spiritual function, they reminded us—for are not these lessons for all time?—that in a healthy old age we should seek to be wholesome not in body only, but gentle of soul also, high-minded, never tiresome, in sympathy and fellowship lifting up the young with the fullness of sweet lessons from the past. In the education of women, while a wholesome interest in political affairs was not denied to them, they were advised to concentrate themselves upon the arts of the home and family. Such, when divested of their necessarily crude biological hypotheses, was the ripe wisdom and sagacity of these great physicians, so near us and yet so far away.

Therapeutics.

The remedial therapeutics of the Roman physicians between Celsus and Galen have not, in their fuller details, at any rate, the same practical interest for us as their hygienic teaching. We may glance somewhat cursorily at a few of the means. In their eclectic and expectant methods, in the development of physical means of cure, and in some use of wine, we note that influence of Erasistratus and Asclepiades upon the pneumatico-eclectic schools to which I have repeatedly invited your attention; but it is with less satisfaction that we turn to note the influence of the Herophileans in that increasing use of drugs, and of violent means such as emetics, clysters, purgatives, and venesection, which gave a certain grossness to the therapeutics even of Galen himself, and under his influence degraded medicine more and more till the days of Molière. Herophilus and his fellows revered Hippocrates in lip-service, and, indeed, did much to preserve and elucidate his writings; but they never obeyed the spirit of his therapeutics, which were founded upon prognosis and upon respect for the functions of Nature.

Asclepiades had, as we remember, carried physical therapeutics to lengths almost, or quite, absurd; as in his swings, successions, and jolts. Therapeutical gymnastics had been admirably developed from the Hippocratean schools through Diocles and Praxagoras of Cos; but it is to be observed that not only by Asclepiades and Celsus but also before them, indeed from Hippocratean times, and more especially in the Coan than in the Cnidean School, the intemperate pursuit or profession of gymnastics was deprecated, not only as injurious to the health, but also as illiberal (*κακοτεχνία*, Galen). Thus by the more sagacious physicians there was a continual mistrust of the gymnastic schools.*

At present, however, I will speak only of the passive movements, of the massage of the period which seems to have been elaborate and refined. By four or six performers the entire body seems, often at any rate, to have been massaged at once—two performers manipulating the arms, hands, and fingers, two the trunk, two the legs and feet. The first stages were slow and gentle, the later became gradually quicker and severer. We may note with interest that gentle massage was practised in fevers, so long as there was no acute focal lesion; the tolerance of the patient of its degrees and durations being carefully watched. The amelioration which by this means they professed to obtain was attributed in part to refrigeration by the induction of sweat. It seems to me, Sir, that in some measure this practice is not unworthy of the consideration of this College. The fever lore of these ancients was, as we all know, enormous; as Wellmann says, and as W. S. H Jones has exhaustively proved, it was a literature in itself.

And we are all well aware also that the cult of water springs and the bath literature of early times, before as well as after Epidaurus, was no less prodigious.† The ancient magic of wells, which developed into the Epidaurian combination of theurgic and therapeutic ritual, had in the times of which we are speaking become a separate resource. The Roman physicians seem to have ignored the Tiber Island. But we read of pure water baths, of saline baths ("which warmed the body"), of oil baths for cramps, pains, and retention of urine, of sand baths, and of sun baths ‡ Asclepiades, and after him the pneumatists, argued against the abuse of warm baths, which, however appropriate in their degrees for debilitated persons, were not bracing enough in fevers, or even for use in health. Here we call to mind Musa's reputed cold-water cure of his august patient. Nurses were lectured for "boiling their children"; and bathers were warned against letting water into the ears, "which damages them." Mineral waters, of course, had their many natural virtues. Archigenes gives us the first rational classification of mineral waters which is extant; he divided them into the alkaline (soda), saline, aluminous, sulphurous, ferrous, cuprous, and bituminous; and elaborately explains their effects on the humoral hypothesis.

Wine.—The place of wine as a remedy is a curious story; in my Harveian Oration (1900) I touched upon it, but there especially as regards its outward application, even from the days of the Good Samaritan. Asclepiades wrote an essay *Περὶ οἴνου δόσεως*, an epoch-making work in its way, the contents of which may be gathered from Pliny § and Dioscorides,‖ amid paragraphs deriving from such recipe compilations as that of Sextius Niger. As I stated in my lectures of last year, Asclepiades, who was nicknamed "*οἰνοδότης*," taught the therapeutical value of wine, and discussed the virtues of its various kinds—the Greek, the Roman, and so on; but the advocacy of Athenaeus seems, from negative evidence, as from the lack of certain details in Pliny and Dioscorides, to have been inspired not directly by or from Asclepiades but to have been influenced by the tradition of Diocles, Praxagoras, and Mnesitheos; authors to whom those compilers do not allude. Athenaeus says that wine when carefully used—used with attention to proper rules of symptoms, of doses, of dilutions, of hours—arouses the pneuma from its torpor, and, as Archigenes repeated afterwards, is especially useful in syncope. Now syncope was then said to consist in a loss of tone (*τόνος*), a vital quality to which the pneumatists attached much importance, and the state of which for the whole body they were wont to infer from the tone of the pulse. From a persistent acceleration of the pulse in fever, for instance, they inferred correctly that the remedy should be withdrawn.

Venesection.—But I need not say that of all the therapeutical means practised and discussed in those days the most ascendant was venesection; and concerning it the controversies of the schools were the most stubborn and acrimonious. In my lectures last year I noted the reserve of Asclepiades in respect of venesection; a means which, for good reasons, he did not withhold, but kept in hand for critical moments. Now the close attention of Athenaeus and the pneumatist school to the pulse gave no little importance to their teaching concerning this remedy. But the protest against the practice of venesection as a potent and a vulgar ally against disease in general carries us back into a much dimmer past. Not to detain you by a long retrospect on the sacredness of the blood—no unfamiliar subject in the Old Testament for instance—I may curtly remind you of this superstition in the semi-Oriental mysticism of Pythagoras; and so onward in medicine it influenced Empedocles and the Sicilian School, Philistion of Locroi, the Cnidians, and Chrysippus. If we may rely upon certain passages in the eleventh book of Galen (150, 197, and 252), Chrysippus stood prominently forth as an

* On this subject the reader is referred to the admirable study by Juthner of Philostratos Ueber Gymnastic, Leipzig, 1909. (Philostratus lived soon after Galen.)

† The Alexandrian Greeks owed but little to the Pharaonic Egyptians, who were, however, as we gather from Herodotus (I, 193, 198, and II, 35-37), at least hygienists. They had a State health service, and practised many ablutions of person and clothing, as did the Babylonians also. The honour of filth in person and clothing was left for medieval times. The Egyptians also vigilantly and ceremoniously protected their water courses.

‡ The reader who desires to know more of this history may be referred to the Second Book of Oribasius, chiefly compiled from the works of the distinguished pneumatist physician Herodotus, pupil of Agathinus.

§ N. H., xxiii, 31.

‖ V., 7

opponent of bleeding, and his deprecation was heeded more especially, so it was said, by one Medius, an uncle of Erasistratus, and by Erasistratus himself and his disciples. This forbearance was a little more remarkable in that the Erasistrateans, and indeed Chrysippus himself, clearly perceived the perils of plethora, but these they combated by diet. The objection to bleeding was formulated as an opening for the escape of the animal spirit (*πνεῦμα ζωτικόν*). Apollonius, a pneumatist of whom we know little, although indisposed to bleeding as a routine, contributed the interesting demur, that in plethora the permeation of the periphery by the *πνεῦμα φυσικὸν* was retarded. As reasonable persons, therefore, they accepted no formula, but, before using the remedy, estimated the general conditions of the malady, the state of the patient as to strength and nutrition and so forth, and especially as to age and sex. Archigenes, however, advised that bleeding in some form was not inappropriate in plethora; and many of the school believed at least that by this means foul humours could be evacuated.* In fevers, however, they had no doubt that to reduce diet, and at the same time to draw blood, was to exhaust the patient;† therefore, to prevent the inflammatory indraught of blood into the arteries in fever the master, after the Alexandrian tradition, bandaged the patient's limbs so as to keep the synastomoses closed, and thus to prevent the conflagration of blood and pneuma in the thorax. For we have seen that Erasistratus, to account for blood in the arteries, assumed certain more or less distal communications between the veins and the arteries, gates normally guarded or closed. On account of this meticulous shunning of venesection, though they limited rather than repudiated it, Galen waxed almost as hot against the pneumatists as against the methodists; but Celsus (52, *3*), in his cool and shrewd way, had said long before, in reference to Asclepiades—"*Sanguinem incisa vena mitti novum non est, sed nullum paene morbum esse in quo non mittatur, novum est.*" The pneumatists, or Erasistrateans, reasonably argued that in many cases local ought to be preferred to general bleeding, as by cupping, scarification, or leeches; and that in many cases even dry cupping or a cataplasm would suffice to draw off a congestion.‡

EMINENT PNEUMATIST PHYSICIANS.

After this discussion of pneumatic doctrines, modified or masked, generation after generation from Alexandrian times onwards, by empirical, sceptical, stoical, and eclectic tendencies, and even by changes of name, and at length formulated for Medicine by Athenaeus in Rome, I propose to return, so far as the fragments will permit me, to the personal story. Of Agathus, and after him of Agathinus the Spartan, who lived in Rome under the Flavian Caesars, and were important links in the chain between Athenaeus and Archigenes, we know little; but it would appear that both of these physicians played a considerable part in the fusion of doctrines to which I have often referred, a fusion which made the name rather than the essential doctrine of the pneumatist short-lived. Greenhill regarded Agathinus as taking the lead in these eclectic or "episynthetic"§ modifications: "*Εκλεξάμενος τὰ ἀρέσαντα ἐξ ἑκάστης τῶν αἱρέσεων.*" Archigenes, who was a pupil of Agathinus, said of his master that he was accurate in all things, and ripe in experience. Still guided by three main clews of pneumatist doctrine—namely, the pulse lore, the fever lore, and the hygienic, paedagogic, and dietetic forms of therapeutics—we perceive at this period more explicitly the fusion of Pneumatism, Methodism, and Empiricism, with a younger and more liberal Hippocratic, or clinical, medicine.‖ This blend of old and new suggests to us progress, an orderly development of medicine; and we shall see presently that a solid, sagacious, clinical school—variegated, indeed, by some sectional dissent—survived, and superseded the arrogant domination and the sterile maxims of the later methodists, such as Thessalus. And yet we must admit that on the dogmatic or clinical side this evidence of sound development was accompanied not merely with a respectful appreciation of older doctrine but with a mechanical tradition of form and letter such as seems to us to be contrary to the spontaneity of life. For although we are wont to suppose that the medicine of summists, of copyists, of large and literal transcripts, belonged to Byzantinism, and signified then the routine, if not of decrepitude at least of an unintelligent conservatism, yet we have seen that the era of scribes and summists must be carried back much farther than we had supposed to a period not only far before Oribasius and Aetius, but before Varro. And plagiarism was not confined to the scribes; even men of natural genius, such as Soranus and Galen, excerpted largely, literally, and anonymously; so did that imposing surgical phantom, Antyllus; and so, says Wellmann, did that no less considerable surgeon, Heliodorus, whom, on the slender relics that remain, I am disposed to regard as of still richer genius. In discussing, then, all these Romano-Hellenist medical writings, we must bear in mind the custom among them of lifting both terms and volumes of the literature one from another, and this without acknowledgement, unless when, happily for us—as often in Galen—controversial animosity goaded to personal attacks. That Celsus named his sources so generously may in the enemy's mouth be one more point of evidence that he was a layman! In the fragmentary and disconnected state of the records of the period, then, we cannot be sure whither and how many of these embedded remains are in their origin and order to be distributed. Any such distribution which, with the aid of far greater scholars than myself, I may now attempt, in order to distinguish individual authors, must therefore partake of much uncertainty, and be in its nature provisional; but in justice to the memory of Archigenes it must be attempted.

Archigenes and Aretaeus.—To appreciate Archigenes, one of the greatest of the physicians of this period, we must first discuss the place of Aretaeus, who, by name at least, is familiar to us all. And probably not a few of us, attracted by the story of the past, have perused, or at any rate dipped into, his treatise, so admirably rendered for English readers by Adams, and have been deeply impressed by his gallery of diseases—portraits select, succinct, deft in their handling, and speaking of character and experience. Galen, more diffused in generalities, never painted such telling pictures of morbid species. From it we have formed, and justly formed, a high opinion of the medicine of the age. This impression I say was just; but that Aretaeus in person justly deserved the honour is another matter. The ancients gave him no such meed. The author, who drops systematic pneumatism in his practice, which is on sound Hippocratic lines and probably moulded in some part upon Asclepiades, and interprets pneuma merely as *φύσις* in the Hippocratean sense of *δύναμις ζωτική*, or generative energy, yet by phrases here and there, such as his emphasis on *τόνος*, betrays his school. He seems to have lived under Domitian or Hadrian, but to have fallen into a long neglect. The first mention we have of him is in the sixth century by Aetius; then by Paul in the seventh; after then he sank once more into oblivion till the middle of the sixteenth, when the Greek MS. of a large part of his work was discovered, and was printed in Paris in 1554. It was now observed that the treatise was written in Ionic Greek; now the Ionic singsong in his day had become a literary fancy, and to use it in medicine was an affectation, even—so competent scholars assure us—an affectation so "grotesque" as to strengthen some suspicions of the writer's originality in other respects. Was the neglect of Aretaeus by the ancients because they knew him to be but a secondhand and archaistic scribe? It does seem probable that in Aretaeus the Cappadocian, who so far as we know never visited Rome, we find a conspicuous example of that prevalence of copying and recopying without acknowledgement which, not unknown among ourselves, then prevailed in the large measures I have indicated.¶ Delicate and complicated as is the task of

* It is interesting to note that in almost all schools of ancient medicine melancholia was attributed to toxic causes.

† In more than one passage of Galen's XIth Book. See also Book X, 376.

‡ Which vein to open in a particular case or malady, in the elbow, in the ankle, in the temple, at the nasal angle, in the tongue, in the little or ring finger, and, not least, on which side of the body, was in the times of which we are speaking, and still more in the Middle Ages, often decided on fantastic reasons. Arteriotomy was practised occasionally by the ancients, but under what conditions is not precisely known.

§ Not, of course, the philosophical school so-called.

‖ We may observe in the pneumatist succession the continuous use of methodist technical words—such, for example, as *ἔνστασις*, a stoppage of the pores.

¶ We do not, of course, estimate these annexations by modern ethical standards. In ancient times written matter when published became the common property of the reading public, "*δεδημοσιωμενα του καταβεβληται.*"

tracing such stolen property from one obscure author to another, yet as out of it comes to light the figure of Archigenes of Apamea, of the time of Trajan, who, like Asclepiades, seems to have suffered unmerited eclipse, we must try, if on main lines only and by renouncing some of those impressions of form which we call the higher criticism, to make clear in summary* certain restorations and redistributions suggested by modern students concerning these records.

Of the confessed compilers Oribasius, who lived during the last three-quarters of the fourth century, was the chief; and of his collection about one-third is extant. The chapters on the poison literature are lost. We know, honest man, from his own references, that he swept into his net Dioscorides, Archigenes, Antyllus, Philumenus, Philagrius, Poseidonius, and Galen. About a hundred years later flourished another such scribe, namely Aetius, and in his collection lies our main source of the poison literature, after Pliny. But Aetius, luckily, did not copy from quite the same sources, nor quite the same things, as Oribasius; he borrowed from Asclepiades, and, so far as extant MSS. inform us, he made a larger use than did Oribasius of Philumenus. Now, who was *Philumenus?* Well, he too was an eclectic methodist and pneumatist of the generation of Galen (about 180 A.D.), and likewise a compiler after the spacious manner of Oribasius; but only some portions of his work, those contained in Aetius and Paul of Aegina, were known until Wellmann's discovery, in the Vatican, of 37 short chapters of his work, most fortunately with the names of the authors submitted to his scissors.† Philumenus again gathered his materials from somewhat different sources; so that these three compilers throw cross lights upon each other and upon their various sources, so that by comparing them certain identifications begin to appear. Philumenus has this particular value for us, that Archigenes seems to have been one of his principal sources. This inference first suggested itself to Wellmann while reading a certain chapter containing an antidote to viper venom which he recognized as the antidote of Archigenes. Now Aetius, in all the diseases concerned, while similar to Aretaeus, is fuller, and presents also some peculiar differences; for instance, in respect of pleuropneumonia and empyema Aretaeus does not extend beyond Soranus. And in respect of headaches and of epilepsy the identification can be carried farther; for herein Soranus, and even Galen, and much later Alexander of Tralles, as well as Aretaeus, followed Archigenes. Not to detain you on points of cumulative evidence, I may say that in the divisions of matter, in the way in which certain drugs are selected and used, and so on, there are further coincidences which are very significant. The conclusion seems to be, then, that Aretaeus was a copyist, as was Aetius; that they copied from some source common to both, and that this source was Archigenes, whom indeed Aetius happens to name. Wellmann, comparing them in parallel passages, declares that Aretaeus is just a servile copy of Archigenes, if not directly, then by the intermediacy of Philumenus; and this may be. But I would remind you that there is much verbal identity with other authors in Galen also; and if I may venture to demur to a judgement of this distinguished scholar, it would be that the agreement in many such passages is substantial rather then literal; and in a broader sense I would urge that similarity of terms, and even of phrases—"literary universalities"—does not necessarily convict an author of plagiary. Phrases which become current in one period fall out of another. In the medical journals of to-day we may readily note the professional dialect and shibboleths of our own time, especially in the writings of the less literary of our brethren. And thus, under the Roman Empire, although, for instance, Aetius did not copy Oribasius, yet in many places there is much similarity between them and no little verbal identity. Nevertheless it seems more than probable that, whether through Philumenus or not, Archigenes was the main source of Aretaeus; and that Philumenus, who reproduced Archigenes, was in his turn the main source of Aetius and no inconsiderable source of Oribasius.

However, there is yet one more of these compilers to whom, if you will forgive me, I must refer—namely, one *Alexander*, of whom I, at any rate, know nothing except the remarkable treatise, easy to lay hands upon, which stands first in Ideler's collection. It consists of two sections, one on problems and one on fevers; and with this it is that we are now more particularly concerned. For this fever chapter is in close conformity, often in verbal identity, with Galen's writings on fever, the pathology of which, with some qualifications of his own, he drew from pneumatist sources. Now in both Galen and in Alexander we find fever divided into two categories, thus: (1) as to severity, πυρετοὶ μέγαλοι καὶ μικροί; (2) as related to the three kinds of bodily substance respectively—the dense, the moist, and the vaporous‡—that is to say, quotidian, septic, and hectic. But on turning to the same passages in Alexander we find a third category—as to "rhythm"; namely, slow, quick, intermittent, and continuous; though it is added that as the motions of heat are infinite so these rhythms glide the one into the other. And, in respect to those kinds of bodily substance, he goes on to say that the harder its constitutional substance the less is the body swayed by the fever, and the less the sympathetic propagation of its motions through the system: thus a quotidian is brief because it vibrates only in the rarest substance of the body. Now this additional matter Alexander must have got from the large work of Archigenes, mentioned by Galen, Περὶ τῆς τῶν πυρετῶν σημειώσεως, from which he had made a somewhat larger excerpt than had the others from the common source to which they all betook themselves. Now fortunately, Galen (VIII, 203) gives the title of an important pathological work of Archigenes; and Oribasius (II, 146) that of his work on therapeutics—namely, Τῶν ὀξέων καὶ χρονίων παθογνωμικά; and Θεραπεία τῶν ὀξέων καὶ χρονίων παθῶν, respectively; both apparently in four books; and these titles, as we shall remember, correspond to the four books of Aretaeus, On the Symptoms and On Treatment of Acute Diseases, and On the Symptoms and On the Treatment of Chronic Diseases.

Now we have the titles of two others of the more celebrated treatises by Archigenes—namely, the Περὶ τῶν κατὰ γένος φαρμάκων and the Περὶ τόπων πεπονθοτῶν (in three books), to which Galen gives high praise. The work on the seats of disease would have been an invaluable document for the historian. We are told that in it Archigenes, with a genuine clinical instinct, inquires if from a comparison of the varieties of functional perturbation, or symptom groups, seats of disease could be inferred; if there be, that is, a signal group for each seat? For example, if we observe this series—orthopnoea, rusty or dark and livid or frothy sputum, fever, pain in the side, and a rapid pulse—we infer a peripneumony. Dyspnoea is common to many maladies, it is true, but we interpret it by its associates; as in this case by fever, the kind of sputum, and so on. Galen (*De locis affectis*) scoffs at a narrower argument of his, that the seats of disease might be discerned even by several kinds of pain; apparently it did partake too much of the nature of a logical exercise, for Galen complains of its new-fangled notions and terms; but nevertheless the method was a sound one. Moreover, upon it Archigenes seems to have built another fruitful clinical idea, that of sympathetic parts, and primary and secondary symptoms. Thus he pointed out how disease in a certain part might betray itself by pain or disorder in a distant part, not itself diseased. He instances, and very appropriately, confusion of vision caused by a disorder seated in the stomach. These views, and the seat or the hegemonic pneuma in the heart, Galen contested; though on the whole treating his great predecessor with respect, and paying him the dubious compliment of copying from him extensively, often without acknowledgement. For example, Galen's description of that notorious disorder the πνιξ ὑστερική—the hysterical suffocation—is identical with that of Aetius, as are both with that of Philumenus, the plagiarist or

* In this summary I rely on Wellmann's *Pneumatists*, and on his article in Hermes, 1903; also on Daremberg's edition of Oribasius, and of Rufus.

† This discovery was one of the many fruits of the formation of the preliminary catalogue for the Corpus by the associated academies. Unfortunately, a vast pile of MSS. thus revised and catalogued has brought in little so far; such matter as 150 indifferent MSS. of the Aphorisms; 100 of the Prognostics, and so on, with quantities of Arabian, Syrian, and Hebrew translations. So it may prove that for Galen we shall have little better than the Ed. Pr., or for Paul than the Aldine. And Aetius is complete only in the Latin version of Cornarius. There was a sad loss of MSS. in the fury of early printing. (See VIth vol. of Pauly-Wissowa; art. on Dioscorides.)

‡ στερεὰ, ὑγρὰ, and ἀεριώδης οὐσία.

copyist of Archigenes.* This description was that the restless uterus attacked the heart through the arteries, the liver through the veins, and the brain through the nerves; the simulation of death was described; and the cause was attributed to a chill to the pneuma, a pathology opposed to the more rational notion, of Soranus, of an inflammation of the womb, which engendered in the cavity a cold and moist phlegm; in quantity no doubt small, but, as he urges, how minute may be the venom of a snake or of a mad dog. Now, in commenting upon this account in Aetius, Valentine Rose proved, by facts with which I will not trouble you, that Aetius did not copy from Galen, but, as we have seen already, from Archigenes, the common source of both writers.

On other subjects, as concerning the cynanches, for instance,† and certain drugs and their uses, a like correspondence is notable, but I will touch on two more coincidences only—namely, concerning elephantiasis and concerning the hellebores used in the treatment of it.

Elephantiasis was so hideous, so alarming, and so conspicuous a disease that, if prevalent, it could not escape observation. We may recognize this horror in its various names, such as leontiasis and satyriasis. On the evidence of silence, then, we may assume that elephantiasis did not appear in Italy until about the time of Themison and Celsus. The first description of the disease, so far as we know, was written in the third century B.C. by Straton, a description handed down to Themison through his master Asclepiades. Of this disease and of its treatment Aretaeus gives a full report;‡ and Wellmann, comparing it passage by passage with that of Archigenes as preserved in Aetius, points out that in this chapter again Aretaeus was a plagiarist of Archigenes. The treatment of the disease was also identical in both—namely, venesection at the elbow, hiera, hellebore, whey, viper preparations; and—externally for the tubercles, the unguent was similar.

The hellebores were in occasional use by physicians in more ancient times. Herophilus, on whose bent for pharmacy I have already insisted, seems to have pushed this use of the drugs in some opposition to Erasistratus: and under Themison, Archigenes, Rufus, and others they came into the common use which is familiar to all classical scholars. Anticyra, Sicily, and Galatia produced the best kinds. Hellebore was used chiefly perhaps for melancholia (which, as I have said, was generally, or always, regarded by the ancients as a toxic disorder), for other insanities, and for pains in the head. Now Aretaeus further appropriates from Archigenes full directions for the use of the herbs: the white hellebore to act especially upon the upper bowel, the black on the lower; and if a prompter action were required the herbs were to be cut very fine. They were used also as urgent emetics. In spite of the prudence of Asclepiades in therapeutics—a prudence and reserve I dwelt upon last year—and the large development of the physical methods of treatment, yet under methodists and pneumatists alike reckless attacks upon disease by powerful drugs prevailed more and more; and unhappily the influence of Galen did little to discountenance them. Emetics were used by the Hippocrateans more rationally, and in moderation by Asclepiades and Celsus also, who advised them in bilious constitutions, and for certain chronic diseases. Asclepiades indeed gave warning that abuse of emetics led to loss of appetite, atony of the stomach, indigestion, and emaciation. Nevertheless, vomitives obtained their vogue under the Empire, and as an instrument of gluttony, became almost habitual. These agents were many in number, ranging from a feather in the pharynx to a pound or a pound and a half of radishes in a horrible mixture with honey, salt, and vinegar; the oxymel of squills being another mawkish alternative.

While referring to the use of hellebore in insanity I may mention not inappropriately that on the treatment of this class of disorders Archigenes seems to have held opinions of remarkable enlightenment. Seeing the priests of Cybele scampering, and flagellating, and cutting themselves after their manner, he said "they are insane, do not leave them to these bloody gods of the East, send them to me." And his therapeutics was no less enlightened, for he fed up the maniac and soothed him with music. What would Bedlam have thought of this eccentricity!

Archigenes, as reproduced by Aretaeus, had a considerable knowledge of the veins and ducts of the liver, and wrote well on phthisis, and on diabetes which was regarded as a melting down of the flesh into urine—a sort of runaway dropsy. And of the anatomy and diseases of the nervous system his knowledge was considerable; for instance, he seems to have been the first to show that hemiplegia falls upon the side opposite to that of the cerebral lesion; and moreover to attach the aura to epilepsy. In his description of tetanus Haeser thinks a note of cerebro-spinal meningitis is to be detected. He recognized also the glandular nature of the kidneys, of the testicles, and of the mammae. One remark of Archigenes might, after the lapse of all the centuries, come as a fresh light to the modern examiner. "What we need is to be fertile in expedients, not to be always paying attention to the writings of other people."§

The surgery of Archigenes, whose fame, says Dr. Withington, was no less honourable as a surgeon than as a physician, and that of other eclectic physicians of this period, presents a very fair story. The ancient Greeks shrank from mutilation; and amputation, mentioned by the Hippocratean physicians only in gangrene as a subsidiary aid, seems, even in Alexandria, to have made no great progress; for Celsus also regarded it as a last sad resource in gangrene; yet by the time of Trajan, under Archigenes, amputation had become a recognized procedure for ulcers, growths, injuries, and even for deformities. The limb to be removed was bandaged, and a tourniquet was placed above the line of severance; or sometimes the chief blood vessels were first cut down upon and tied, and the smaller tied, or twisted, during the operation‖—"transfixing them with a sharp hook and twisting them round and round and closing them by this twisting"—a proceeding of which there is no trace in Hippocrates, nor apparently in the earlier Alexandria. These good methods were afterwards obliterated by the bad fashion of the searing iron. But we know that Galen used the ligatures, and where the shop was at which he bought them. Moreover, as we noted under Soranus, the whole field of surgery had come under a more intensive cultivation. Still, if it be true that in Alexandria capital operations had not made much way, yet by the traditions of Apollonius of Kition, of Lysimachus of Cos and other Hippocratean commentators, of Apollonius Mys (a Herophilist from Alexandria), of Dioscorides, and especially of Philoxenus, we learn that nevertheless in that anatomical school surgery was carried actively forward; for instance, in cutting for stone and operating for hernia, operations which, before and after the prey of specialists and adventurers, seem then for a while to have been undertaken by the general surgeon; and by Heliodorus resection of the long bones was performed. How much of the more advanced surgery under the Empire was due to Romano-Greek physicians, as, for example, to Heliodorus and to that tantalizing shade, without local habitation, Antyllus—a personage who probably owed much to Heliodorus but of whom we have little more than a glimpse in Oribasius—and how much of it flowed derivatively from earlier sources we cannot definitely say; but the progress seems to have been substantial and largely original.

Out of such fragmentary and allusive records as I have tried to stitch together recent historians of medicine, and Welimann especially, have endeavoured to reconstruct the figure of the great eclectic pneumatist, of methodist origin, Archigenes of Apamea; a figure not wholly eclipsed in the transit of Galen, for in the sixth century his memory is still revered by Alexander of Tralles as *θειότατος εἴπερ ἄλλος*. That Juvenal speaks of him as a fashionable practitioner need not derogate from his merits, as we pleaded in the life of his greater predecessor Asclepiades, and as we might have to plead for fashionable physicians of our

* We may conveniently regard Galen's works as consisting in part of his own original observations and thought; in part of fugitive pieces concerned with questions of the day; in part of compilations.

† Vide, e.g., *Die Halskrankheiten bei d. altgriechischen u. römischen Aerzten*, von J. Weigel, Leipzig, 1907.

‡ It is a curious feature in Aretaeus (Ed. Adams, p. 123) that he describes at length the elephant from which the disease took its name. Why? As a transcriber? Oppian gives this same description, one copied, it is said, by both writers from Amyntianus' Περὶ ἐλεφάντων; a book I find (in *Smith's Dict.*) is referred to by a scholiast on Pindar.

§ χρὴ δὲ καὶ αὐτόν τινα συνευπορέειν, μὴ πάντα αλλοτρίῃ ξυγγραφίῃ προσέχοντα τὸν νόον.

‖ Vide Daremberg and Bussemaker's edition of Oribasius, excerpts from Heliodorus's great Χειρουργούμενα in five books; and notably the passage περιστρέψαντες πολλάκις καὶ ἀποτυφλώσαντες αὐτα διὰ τῆς περιστροφῆς.—Lib. L, c. 4.

own day, who, wise men as they are, do not disdain empirical and persuasive remedies when no arm of precision is at hand. Archigenes seems in character to have been a blend not only of several schools of doctrine, but also of several complementary qualities: of theorizing proclivity, yet rational in methods and technically sound in practice. To his clinical insight the fruitful distinction between primary and secondary disorders, and the indication of localizing symptoms, which I have quoted from Aetius, is strong testimony. If, on the one hand, it appears from Galen's respectful criticism, and from other witness, that, after the fashion of the pneumatists, he was in preciosity of language and in sophistical dialectic something of a pedant, yet, on the other hand, he did much to deliver medicine from the cramping influence of the methodist common forms based upon an abstract principle, like the "homoeopathic" formula which in our own day became for a while so dear to that most theoretical of creatures the "practical" man. Nay, if besides he seems to have fallen in with the use of amulets and such like, probably it was a tolerant and humorous observer of the foibles of mankind, and of the magical influences of faith, rather than as a charlatan or a sorcerer.

I have said that to enter upon the poison literature would in this course be impossible, for in its biological and pharmaceutical aspects it would require a lecture for itself alone. Such a chapter may be added to these lectures hereafter; but in conclusion I would indicate the place of Archigenes in this current of medical history. We have seen that Philumenus, in his Περὶ τῶν ἰοβόλων ζώων καὶ τῶν ἐν αὐτοῖς βοηθημάτων, drew largely upon him, as he did upon less eminent men of the school of Athenaeus and Soranus; and this not least in respect of poisons and their antidotes. Our tradition of the poison literature, more or less mingled in its course with that of cosmetics, begins with one Apollodorus of Alexandria (c. 300 B.C.); and thence in dark volume it flowed through Nicander, Philinus, Andreas, and that remarkable man, a Herophilean turned empiric—Herakleides of Tarentum. Krateuas, who seems to have worked under the patronage of Mithridates Eupator, is a very important link of this chain.* It is with Krateuas that we enter upon the Attalid and Mithridatic period of this art and mystery on which the *locus classicus* is the twenty-fifth chapter of Pliny's *Natural History;* and so to Dioscorides, to Philumenus, to Aetius who borrowed from Philumenus, and to Galen. Thus at second hand Archigenes became a main source of this sinister lore for the Middle Ages, and for the papal and ducal circles of the Renaissance.

In these lectures, Sir, if I have failed—and with but our present resources we may hardly succeed—to bring the physicians of Rome out of chronological tables and to present them in living portraiture; yet, if, in my subordinate degree, I have made some fair endeavour to illustrate the inner movements and to read the genius of those variously gifted races of whom Roman medicine was engendered—the dreamy Sicilian, the positive and sagacious Greek, the subtle and demonic Oriental—which, blended in Alexandria, inspired the motley players who walked the stage of our art and mystery at the feet of the imperious mistress of the world; if in any fair measure I have done this, my labour and your long-suffering—for which I gratefully thank you—may have been not wholly in vain.

FOUR CASES OF PNEUMONIC PLAGUE.

By H. P. SLEIGH, M.B.,

MEDICAL OFFICER OF HEALTH, SAMFORD RURAL DISTRICT COUNCIL.

Cases of plague in this country are comparatively rare, and although the daily press has given somewhat distorted accounts of the four cases recently occurring in Suffolk, readers of the Journal may find an account of them to be not without interest.

The cases occurred at Freston, some five miles from Ipswich, in the households of two farm labourers. C.'s child, aged 9 years, was taken ill on September 13th and died on the 16th; the mother, aged 40 years, was taken ill on the 21st and died on the 23rd; C., aged 57, was taken ill on the 26th and died on the 29th; and a neighbour, Mrs. P., aged 43 years, who nursed C.'s wife on the night of the 22nd and 23rd, was taken ill on September 26th and died on the 29th.

True to description, the disease had picked out two very dirty households; and again, of all the people coming into close contact with the patients, only those who had but little respect for hygiene were infected. Three nurses who were unremitting in their attentions to the sick escaped.

The *incubation* period was definitely five days.

Prodromal symptoms were not well marked. All the patients complained of being "not well" a few hours before the onset of illness; and in one case—that of the child—there was sickness.

The *invasion* was sudden, and in one case at least the illness was ushered in by a rigor. All complained of severe frontal headache. The features were drawn, the expression vacant, and mental ineptitude was well marked. The temperature was high from the commencement, the thermometer registering 105° in two of the cases and 103° in the other two within a few hours of the onset of the illness, and remained high till within twelve hours of death, when in each case the temperature fell a couple of degrees.

Respiratory System.—Respirations in all four cases were quickened from 30 to 40 per minute. In only one case (Mrs. P.) was there definite lobar pneumonia; in two there were evanescent patches, and in the fourth no signs of pneumonia were detected. The case with definite pneumonia had no expectoration at any time of the illness; the other three had thin dark blood-stained expectoration.

Circulatory System.—The pulse in all cases was feeble and fluttering, and ranged from 120 to 140 per minute.

Digestive System.—The tongue in each case was red at tip and edges, but the dorsum was covered with a thick yellowish fur. In two of the cases there was sickness and diarrhoea.

The spleen in one case at least (Mrs. P.) was enlarged, but no other glandular enlargement was detected.

Nervous System.—In the child there was delirium, but in the others consciousness was unimpaired till the end, and in one case (Mrs. P.) the patient gave thoughtful and intelligent instructions within ten minutes of her death.

Diagnosis.—It was at once recognized that this was a highly contagious disease, so that prompt measures to isolate contacts were adopted. Drs. Brown and Heath, of Ipswich, were asked to see the cases in consultation, and from specimens of sputum and blood taken from the last three cases Dr. Heath ultimately discovered the *Bacillus pestis* in all the specimens, but this was not demonstrated till too late to adminster serum treatment.

Investigation as to the cause of the outbreak elicited the fact that a great many rats were dying in the neighbourhood, and on bacteriological investigation many of these, as well as a hare and a cat, were found to have plague. On further investigation it was elicited that five years previously eight persons were similarly attacked near Shotley, and about six miles distant from Freston. Of those eight persons attacked, six died, and I have no doubt, from the reports given me, that they also were plague. These cases occurred about a quarter of a mile from the river Orwell, and at a point exactly opposite to where the larger ships anchor to lighten their cargoes into barges to enable them to proceed up the river to Ipswich. It would be an easy matter for rats to swim ashore from those boats at this point, and it is surely not mere coincidence that rats on the other bank of the river at this point have since been proved bacteriologically to have plague. There certainly has been an undue mortality amongst rats since the occurrence of those eight cases, and it would almost appear as if there has been a chronic condition of plague amongst rats in the district since that time.

There are, however, other possible sources of infection which are under investigation; the results, when complete, will no doubt be made known.

It is now known that other districts in Suffolk have a "rat plague," the cause of which is being investigated alongside with this district.

To prevent the spread of infection stringent measures were adopted. All contacts were quarantined for a period of ten days; in both houses all articles that could not be thoroughly disinfected were burned, the rooms were carefully disinfected, their walls were stripped, and afterwards

* Vide Krateuas, von M. Wellmann, Berlin, 1897.

repapered or distempered. The destruction and disposal of rats over a wide area was undertaken by the sanitary authority, willingly assisted by the public, and this is meanwhile being done methodically and with excellent results.

I am indebted to Dr. Carey of Holbrook for notes on the cases in C.'s family; to Dr. Brown of Ipswich for much valuable advice at the consultation; and to Dr. Heath for his bacteriological examinations.

THE RECENT PLAGUE CASES IN SUFFOLK.

BY

HERBERT H. BROWN, M.D., F.R.C.S.,

IPSWICH.

MUCH interest has been aroused by the recent death of four people from pneumonic plague at the village of Freston, four miles from Ipswich, and the subsequent discovery that the disease is fairly widely spread among rats and other rodents in this part of Suffolk.

On September 13th a little girl of 9, living with her mother, stepfather, and two or three other children in a small cottage at Freston, became ill. Vomiting was the first symptom. On the 14th she was seen by Dr. Carey of Holbrook, to whom I am indebted for notes of this and the succeeding case. At his first visit Dr. Carey found a temperature of 105° but no signs of pneumonia. On the following day, September 15th, bronchial breathing was detected at the base of one lung. She had been delirious during the night before, but not in the day, though rather drowsy. During the following night the cough was somewhat troublesome, and there was vomiting and diarrhoea.

She died on the next day, September 16th. The temperature throughout had been about 105°. She was nursed by her mother, Mrs. C., and was buried on September 20th.

On September 21st Mrs. C., the mother, was taken ill. She got up as usual on that morning, but complained of headache and a feeling of sickness.

Next day, September 22nd, Dr. Carey was sent for. He saw her at 3 p.m. He found a temperature of nearly 105°, rather rapid respiration, and crepitant râles at the bases of both lungs.

During the night of the 22nd there was vomiting and diarrhoea.

On the 23rd she was seen by Dr. Carey at 10 a.m. She was almost pulseless, respiration laboured and gasping. He sent to ask me to see her in consultation with him, but she was already dead when I arrived at about 12 noon. I took away some sputum for bacteriological examination. The sputum was brownish in colour, as though tinged with anchovy sauce, and did not at all resemble ordinary pneumonic sputum.

I gave the sputum to Dr. Heath for examination, who reported that it contained pneumococci and Gram-negative diplobacilli in large numbers.

On the 26th G. C., the husband of the last patient, and Mrs. P., who had nursed her during the night of the 22nd, were both taken ill. Dr. Carey informed me of the occurrence on the 27th, but as I was unable to visit them that evening I asked Dr. Heath to go instead. He saw G. C. and obtained some blood from the ear for examination.

On the 28th I visited both patients in consultation with Dr. Carey and Dr. Sleigh, and took a syringeful of blood from the basilic vein of G. C., and fluid from puncturing the pneumonic lung in the case of Mrs. P. This material I gave to Dr. Heath, who made cultures in agar and bouillon and prepared films.

The films, especially those from the pneumonic lung, showed very numerous bacilli, identical with plague bacilli, with the typical bipolar staining, and the cultures in bouillon, the characteristic "stalactite" growth. The cultures and films were at once submitted by Dr. Heath to Professor Sims Woodhead, of Cambridge, who confirmed his diagnosis, and later to Professor Klein and Professor W. G. R. Simpson.

The course of the disease in these two cases was as follows:

G. C., who was a farm labourer, started to work as usual on the morning of September 26th, but complained of backache and "feeling bad." He attended his wife's funeral on that day and then went to bed.

On September 27th he was seen by Dr. Carey. He was flushed; temperature 103°. He had not vomited, and there were no signs of mischief in the lungs. A nurse was sent from Ipswich on this evening.

On September 28th I saw him with Dr. Carey. He was very flushed and rather drowsy and lethargic, but complained of no pain. On examination of the lungs, I found no dullness or bronchial breathing, but moist crepitant râles over both bases. During the night his temperature was 104° or 105°. He slept at intervals, took nourishment well. He complained of thirst, and of feeling drowsy, but had no pain. There was slight cough and some expectoration. Pulse about 120. Respirations from 30 to 40. He perspired freely. There was no diarrhoea or vomiting.

On the 29th his condition was much the same, temperature a little lower. There was no loss of consciousness or marked change until three minutes before death, which took place at 7 p.m.

Mrs. P., the neighbour who had nursed Mrs. C., was taken ill on the morning of the 26th.

In her case pneumonic symptoms were prominent from the first. She had a high temperature from the commencement, and on the 27th there were obvious signs of pneumonia in the left lung.

She was treated by Dr. Sleigh, of Holbrook.

A nurse from Ipswich took charge of her and G. C. on the night of the 27th. She complained of severe pain on the left side of the chest, near the angle of the scapula. The left side of the face was very flushed. She lay generally on her right side. She coughed very little during the night, and there was no expectoration. Temperature from 103° to 104° F. No delirium; no diarrhoea or vomiting.

On the 28th I saw her with Dr. Sleigh at 11.30 a.m. The respiration was about 50, laboured and rattling; pulse 130, very compressible. Face livid. There was dullness to percussion over the left back, as high as spine of scapula, and bronchial breathing. There was also dullness and signs of consolidation at the extreme right base.

During the night of the 28th she complained of severe pain in the left side. Vomiting and diarrhoea came on at very frequent intervals till death, which took place on the morning of the 29th.

There had been no loss of consciousness and no delirium. Some cough, but not much expectoration. Temperature 105.6° F. before death.

In all four cases death occurred after a short illness, in only one as late as the fourth day. In all cases there was definite evidence of lung congestion, although in only one was there extensive pneumonic consolidation: and in all except one there was diarrhoea and vomiting before death. The temperature in all was high, from 103° to 105° F. or over, and they were conscious throughout, almost up to the moment of death.

The characteristic bipolar-staining bacilli were found in the sputum of the second case, in the blood of G. C., and in the fluid from the lung of Mrs. P. In this last they were exceedingly numerous.

When the nature of the disease was determined, all who had been in contact were isolated, and the cottages thoroughly disinfected. There have been no fresh cases since.

As numerous rats and some hares and rabbits had been dying in the neighbourhood, two rats and a hare were sent to the Local Government Board, and submitted to Professor Klein for examination. In each the presence of plague bacilli was proved.

Many rats and other animals have been since examined by Dr. Heath and others, and it is evident that the infection among these animals is fairly widely spread; but owing to the energetic measures which have been and are still being taken, it is hoped that the disease may be stamped out.

No case of infection among rats has been found within the borough of Ipswich.

THE late Dr. William Thomas Law, of Bournemouth, left estate valued at £8,950 gross, with net personalty £8,536.

RADIUM THERAPY IN EYE DISEASE.

BY

ARNOLD LAWSON, M.D., F.R.C.S.,

AND

J. MACKENZIE DAVIDSON, M.B., C.M.ABERD.

THE present paper is an outcome of an investigation carried out by Mr. Mackenzie Davidson and myself into the possibilities of radium as a therapeutic measure in eye disease. We have carried on the work with the limited time at our disposal for over a year, and now venture to bring forward the results obtained, in the hope that they may stimulate further inquiry and research.

A good many of the present cases were mentioned in a preliminary note published in vol. xxix of the *Transactions of the Ophthalmological Society*, but no statistical tables such as are appended to this paper were made, and all the cases are now grouped together and their special features detailed for easy inspection.

We can endorse more fully now the opinion which we then ventured to express—namely, that radium is likely to prove of great service, both in the treatment of external diseases of the eye and in those of the eyelids. The results are in many ways most encouraging, and the field of utility for radium in eye disease has widened considerably since the time that it was first shown to be a specific for rodent ulcer.

Method of Application.

The method of applying the radium was crude but satisfactory. The eye was first cocainized and the radium, which was contained in sealed glass tubes permitting only the passage of beta and gamma rays, was applied directly to the affected part. The fingers of the operator were protected by enveloping first that part of the tube not required and then the fingers in a thick, continuous wrapping of lead foil.

The process is tedious, especially as care must be exercised to keep the tube in close contact with the part desired to treat which is often very small, but no more efficient way could be devised.

Length of Exposure and Dose.

There are two points to which we should, in the first place, like to draw attention. First—and this is of vital importance—in no single instance have we observed the slightest ill effects from the use of radium. We have, of course, exercised caution, especially when dealing with the eye itself, and it is probable that when the actions and dangers of radium are more fully understood there will be a much greater freedom in repeating the sittings than we thought advisable.

The second point is that no increase of inflammation or aggravation of symptoms occurred in any case, with the one exception of pain, to which I shall refer again later on, and which, when it occurred, was usually transient and not severe.

It is, of course, of the utmost importance, in dealing with a substance such as radium, that at the earliest possible moment positive rules as to the size of the dose to be employed and length of the sitting, as well as the frequency with which the sittings should be repeated, should be laid down for the guidance of the inexperienced.

At the present time it is unfortunately impossible to give more than a few general indications, and to point out by results obtained the most likely road to a successful issue.

With regard to the eye itself, we had no basis upon which to found our observations, so we thought the best plan would be to fix a time limit which would not endanger the integrity of the eye, however large a dose it might be considered desirable to try. Mr. Mackenzie Davidson's experience with radium here proved the deciding factor, and an exposure of five minutes was fixed as being absolutely safe.*

With regard to the dose itself, it will be obvious to anybody glancing over the appended statistics that very many and varied doses were employed. We were chiefly guided as to dose by the character of the lesion to be treated, considering that one exhibiting a tendency to spread or infiltrate surrounding tissues, or marked by any special virulence in its progress, would probably require a larger dose than a small, superficial, or non-infiltrating lesion. Further, being anxious to try the effects of as many variations as possible, we in many cases used a different dose for the second sitting to what was employed in the first instance.

It soon became evident that lesions of the cornea could be treated successfully with this time limit of five minutes by the same dose which, for affections of the skin and lids, required an exposure three or four times as long, and also that superficial lesions of the cornea frequently do not need any more than quite a small dose, such as 5 to 10 mg., applied once or twice as the case might demand.

Looking back upon our experience, I am inclined to think, and Mr. Mackenzie Davidson agrees with me, that a supply of 20 mg. is sufficient to combat any external affection of the eye in which radium is likely to be of service.

Frequency of Exposures.

With regard to the frequency with which the exposures were repeated, we were guided entirely by the progress or otherwise of each individual case.

When dealing with a virulent and highly dangerous process, such as a hypopyon ulcer, it was obviously necessary to get a result with the least possible delay, and consequently the exposure was repeated as soon as was considered safe, if no improvement had been noted. Whereas, in milder cases, we were content to wait longer for signs of amelioration, being anxious to find, if possible, the minimum number of sittings necessary to effect a cure.

The effects of radium are continuously exhibited for a considerable space of time, extending into a matter of six weeks at least, and so some of our cases had only one sitting, and a perfect cure resulted.

The margin of safety with regard to the minimum interval that should elapse between the sittings must obviously depend upon the dose employed. The larger the dose, the sooner should its effects be produced, and the longer the interval between the sittings. Consequently, if a large dose was considered necessary at the first exposure, we seldom repeated it with less than a week's interval, except it happened to be noted that the disease continued to spread in spite of the treatment, in which case we considered that a second exposure might safely be given at a rather shorter interval.

RESULTS.

Before briefly reviewing the results obtained, it must be clearly understood that as soon as the patient was submitted to radium all other forms of treatment were as far as possible omitted. In some cases, such as corneal ulcers, it was considered advisable to continue the use of atropine and a pad and bandage, and in most cases the patient was also given boracic lotion for the purpose of keeping the eye clean. In the case of corneal ulceration it may be perhaps argued that this would to some extent discount the value of the result obtained, in that the patient might have been cured by this method of treatment alone; but, with few exceptions, the cases submitted to radium were of a kind not usually amenable to this simple treatment, and were selected on this account. Further, many of them had had previous treatment without success before radium was employed; and, lastly, a few superficial cases were undertaken to note whether radium, employed in addition to the simple routine treatment of pad, boracic lotion, and atropine, afforded a likelihood of effecting a more speedy cure.

The immediate effects of applying radium directly to the eye are practically *nil*, beyond an evanescent photophobia and irritability, which are probably simply a reflex disturbance induced by the method of application, and which would probably appear just as markedly if a stick of chocolate, instead of radium, were employed.

A few hours after the sitting a certain proportion of the patients complained of pain, which in a few instances was severe enough to cause a sleepless night. As a rule this symptom had passed away within twenty-four hours, but once or twice the patient has told us that the pain lasted more or less continuously for a couple of days. This,

* With regard to this point, I may say that Mr. Mackenzie Davidson, in dealing with rodent ulcer affecting the lid border, found that a tube of 20 or 30 mg. could be applied to the inner surface of the lid, and so lie in contact with the sclerotic for a period of half an hour without causing any ill effect to the eye.

I think, is the longest period in any instance. As a rule the pain was not at all severe, and it has been differently described by patients, some saying that it was of a throbbing character, whilst others described it as a numbing sensation. A large proportion experienced no pain at all.

In only one instance did a patient complain of any sensation referable to the retina, and that occurred in a case of episcleritis—one of the first cases which we treated—in which the application of a very large amount of radium (59 mg.) had been employed for five minutes to the sclerotic. This patient said that after the application she was much troubled for the space of an hour or so by the appearance of flashes of light proceeding from the side opposite to that treated. After this once passed off there was no return of symptoms, nor has there been any evidence of impaired function since. With reference to the production of this symptom, it is worth noting that if a tube of radium is placed against the closed lids in a darkened room a faint, though quite definite, sensation of light is imparted to the observer.

After the initial discomfort, if any, has worn off, the patient usually experiences a rapid improvement in the subjective symptoms from which he had previously suffered, and this speedy anaesthesia, if it may be so called, is a very striking feature of the treatment.

With regard to affections of the lids and of the eye other than those involving the cornea, a much longer exposure with a large dose (20 mg. or more) was borne without any expression of subsequent discomfort, and, if the part to be treated involved the skin, a dose of 30 mg. applied for fifteen minutes will only produce a subsequent sense of itching and heat over the treated area.

With regard to the more remote effects of applying radium to the eye, it is very gratifying to be able to say that in not a single instance did we obtain any untoward inflammatory exacerbation as the result of treatment.

A certain number of cases did not respond at all to the radium, but in those that did so the effect produced was simply that improvement became manifest, rapid or slow as the case might be, without any characteristic clinical signs.

A noticeable result of treatment by radium is the character of the scars produced, which are best exemplified in cases of spring catarrh. They are perfectly supple and smooth, and do not exhibit the slightest tendency to cause cicatricial dragging; but they are very strikingly bloodless, and the tarsal surface of the lid after the cure of a case of spring catarrh presents a very blanched appearance.

Before closing, I should like to make a few remarks with regard to the statistical tables which are appended as a supplement to this report.

The cases selected for treatment may be divided into four groups.

1. Ulcerations of the cornea.
2. Non-ulcerative acute inflammations of the cornea and sclerotic.
3. Affections of the lids.
4. Corneal scars.

We purposely did not attempt cases of a kind readily amenable to simple forms of treatment, such as phlyctenular keratitis, nor did we try the treatment on trachoma. Perhaps some apology is needed in this respect, but our time was unfortunately very limited, and it had already been shown that trachoma could be cured by exposure to *x* rays. We felt that in this case radium would almost certainly be shortly proved to act as a specific for this disease, the more especially as it is so successful in the treatment of spring catarrh; and I, for one, venture to hope that this paper will result in an extended trial of radium for the treatment of trachoma, employing a similar kind of exposure and dose to that found successful in dealing with spring catarrh.

Corneal Ulcers.

The first 17 cases in the tables deal with various corneal ulcerations. The results obtained were universally good with one exception, and that was Case 16, where, I think, the failure was due to continuous infection of the ulcer by the septic condition of the lids. The latter, in accordance with our rule, were not treated whilst trial of radium was being made. It will be noted that not a few of the cases were treated successfully with a very small dose (5 mg.) applied once or twice. The rapidity with which improvement followed the first exposure to radium was a striking feature in nearly every case, as was also the rapidity of the healing as soon as it had commenced.

In no case, with the exception of that already quoted, did the ulcer continue to progress after radium had been used, although the length of convalescence necessarily varied very considerably.

Non-ulcerative Inflammations of the Cornea and of the Globe.

Seven cases of acute interstitial keratitis are reported. It is very difficult in a disease of this sort to make any dogmatic statement, with so few cases on record, and we therefore leave the cases to speak for themselves. However, one or two rather striking results were obtained.

In case No. 20 one eye was treated with radium and the other eye, which was attacked soon after the first, was not so treated. The eye in which radium was employed made a much better recovery than the other, the cornea showing barely a trace of the old complaint, whereas the other cornea has a well marked central haze.

In case No. 21, the attack of interstitial inflammation, which was caught in its earliest stage, certainly did seem to be cut short by radium, and the symptoms never became acute, whereas in the other eye, which was previously affected and not treated by radium, the inflammation was of a severe description, and the patient was under constant treatment for six months.

Case No. 26 (recurrent episcleritis), which was a typical case of a most troublesome disease, is worth mentioning, because the improvement after radium was used was so extremely marked in every way. The patient expressed herself to me a week after radium had been used as feeling more comfortable than she had done for months.

Case No. 27 (keratitis profunda), which was an excellent example of a comparatively rare condition, is also interesting. This patient came under my observation a month after the loss of sight had commenced. Various remedies had been tried without the slightest effect, and the case was handed over to me on this account, as the patient was getting restless, and threatening to go to Wiesbaden, where tears are wiped away from all eyes.

Case No. 40.—This case of recurrent inflamed pterygium was quite one of the most striking illustrations of the power of radium to reduce inflammatory processes. The patient has, during the whole of the treatment, continued his work in a gunpowder factory, exposed to the fumes which have no doubt been the essential factor in producing and maintaining the condition. The condition was regarded as hopeless when the patient was sent for treatment.

Affections of the Lids and Corneal Scars.

There is one point to which I want to draw special attention, and that is the continued success of the treatment of spring catarrh. There is, I think, no doubt that, for this disease at least, radium acts as a specific cure.

Mr. Mackenzie Davidson has two more cases under his care at the present time, both of which are doing well. Large doses of radium, however, appear to be essential.

Case No. 33 had a good trial with a 5 mg. tube without the slightest benefit, and it is certain that a long exposure with a small dose will not produce the same result as a large dose given for a short space of time.

Our attempts to deal with the removal of fine, downy, ingrowing lashes was not a success, though much patience was exercised in the effort. Nor was the treatment of old corneal nebulae productive of much obvious benefit. It is, however, possible, seeing that two of the four patients were very positive of improvement, that large doses of radium applied continuously at intervals of three weeks or so, over a long period of some months, might effect a radical and permanent increase in the vision, and more extended effort might be made in this class of case.

Finally, the great drawback to the more general use of radium is its present prohibitive price. It is to be sincerely hoped that this will in the near future be considerably lower, so as to come within the means of the ordinary man.

The present system of cornering the supply and amassing it in institutions which can utilize it as a means of obtaining prodigious fees is most prejudicial both to the prestige of the profession and to public interest.

No.	Name.	Age.	Sex.	Nature of disease.	Number of exposures and dose.	Result.	Remarks.
1	G. S.	53	M.	Hypopyon ulcer	2 exposures of 29 mgrm. tube. First exposure for 5 minutes. Second exposure for 2 minutes 1 week later	Cured	Ulcer caused by wound from metal 7 days previously. Large central infiltrating grey ulcer with small hypopyon. Hypopyon much smaller the day following first application; quite gone on third day. Ulcer quite healed with small grey facet 14 days after first exposure.
2	J. B.	22	M.	Hypopyon ulcer	1 exposure of 29 mgrm. tube for 3 minutes	Cured	Ulcer caused by injury from fragment of mortar. Small circular ulcer just below pupil with small hypopyon. Hypopyon had disappeared on the third day, and the ulcer no longer stained to fluorescin.
3	W. C.	23	M.	Corneal ulcer with vascular fasciculus and pannus	2 exposures of 5 mgrm. tube for 5 minutes with an interval of 3 days between the applications	Cured	Patient had had several previous attacks of inflammation. There was a nebula occupying a large area of the cornea with a moderate degree of pannus and a small superficial erosion near the centre. The pannus had quite disappeared and the patient quite well, except for the nebula, 11 days after the first application.
4	T. S.	65	M.	Corneal ulcer with vascular fasciculus and pannus	2 exposures of 5 mgrm. tube at an interval of 3 days	Cured	A case much like No. 3. Recurrent attacks of inflammation extending over many years. The cornea was largely nebulous and moderate pannus was present with much general irritability. Ung. flav. was tried before radium, but it did no good. 10 days after first exposure the eye was white and subjective symptoms had disappeared.
5	M. T.	61	F.	Corneal ulcers	1 exposure of 29 mgrm. tube for 5 minutes	Cured	Patient gave history of painful inflamed eye for 3 months. Much injection of bulbar conjunctiva, with two patches of corneal ulceration of an infiltrating character. One patch was large, oval in shape, and about 3 mm. in length and 1 mm. in diameter. 2 days after exposure the ulcers did not stain to fluorescin. Bandages removed 6 days after exposure. The resulting nebulæ were extremely faint.
6	D. B.	43	M.	Corneal ulcer	2 exposures of 5 mgrm. tube for 5 minutes at interval of 7 days followed by 1 exposure a week later of 39 mgrm. for 5 minutes	Cured	A case of deep ulceration resulting from breaking down of an old scar, the result of injury several years previously. The exposures of the 5 mgrm. tube had no effect, but the ulcer quickly healed after the strong dose of 39 mgrm. In this case there was deep ciliary injection and some iritis.
7	C. S.	—	M.	Corneal ulcer with large hypopyon	1 exposure of 49 mgrm. for 5 minutes. 1 exposure of 59 mgrm. for 5 minutes 10 days later. 1 exposure of 39 mgrm. for 5 minutes 3 weeks later	Cured	An exceedingly bad case. A dirty yellow, spreading ulcer of cornea with large hypopyon and a muco-purulent discharge from lids, which were injected and chemosed. A corneal paracentesis was performed before radium was tried, as the condition was extremely urgent, but the patient did not improve much. 13 days after paracentesis the lower third of cornea was densely infiltrated and sodden, with some bulging present. Improvement was rapid and continuous immediately after the first exposure to radium. Very large doses were used, as the case was so bad, but no pain or reaction followed any of the applications and a sound, excellent scar resulted with the pupil fairly active. V = $\frac{+}{6/6}$.
8	E. H.	30	F.	Herpetic ulceration of both corneæ	2 exposures of 5 mgrm. for 5 minutes with an interval of 4 days	Cured	Both corneæ were dotted with multiple punctate staining areas, the result of the rupture of vesicles. In the left eye the central two thirds of the cornea after douching stained deeply to fluorescin. In this eye there was also a linear ulcer with some surrounding infiltration. 4 days after the first exposure there were still a few staining points, but the linear ulcer was healed over. 4 days after the second exposure both corneæ were quite healed. 11 days later there was an acute muco-purulent conjunctivitis with some relapse of staining at a few points, but the patient quickly recovered with a weak lotion of zinc sulphate.
9	J. B.	49	M.	Vascular facetted ulcer of cornea	1 exposure of 5 mgrm. for 5 minutes	Cured	A deep central facetted ulcer with a staining area of 2 mm. diameter and a good deal of surrounding infiltration of the cornea. There was severe pannus and much injection of the globe. The patient rapidly improved after exposure and was quite well a fortnight later. The ulcer was the result of a second attack of inflammation, and there was some iritis.
10	E. J.	17	F.	Mooren's ulcer	2 exposures of 29 mgrm., the first exposure for 5 minutes and the second, a week later, for 3 minutes	Cured	There was a history of repeated attacks of inflammation for 18 months. The present attack had lasted a fortnight. There was a grey haze of rather varying density, with numerous new vessels extending over the upper two thirds of the cornea with an advancing irregular line below, which stained to flourescin. 6 days after exposure there was no staining and the eye was quiet. 1 day later there was a little pink injection of the eye, and it was considered advisable to use radium a second time. Patient was last seen a month later, when the eye was quite well.
11	C. W.	20	M.	Recurrent vascular ulcer of cornea	3 exposures of 5 mgrm., the second exposure 2 days after the first, and the third exposure 4 days after the second	Cured	The present was the third attack of inflammation in 6 months, and the eye had never got quite well between the attacks There were 2 punctate superficial erosions with many grey maculæ dotted over the upper portion of the cornea. Pannus was considerable. 2 days after the first exposure there was much less injection and only one minute staining point. 7 days later the patient was quite well except for a little pink injection about the corneal limbus

No.	Name.	Age.	Sex.	Nature of disease.	Number of exposures and dose.	Result.	Remarks.
12	M. S.	26	F.	Recurrent erosions of cornea; herpes of cornea	59 mgrm. applied for 5 minutes. Patient was cured for a time. Relapse 2 months later, when the other eye also became affected. 1 exposure of 49 mgrm. to first eye for 5 minutes, and 2 exposures of 49 mgrm. to the second eye with interval of 13 days	Cured?	This case had been under treatment off and on for 14 months before radium was tried. The patient suffered from repeated attacks of superficial ulceration and pannus affecting both eyes and different portions of the cornea. The attacks consisted of eruptions of small staining areas near the limbs with superficial pannus and much irritation and photophobia. Radium produced immediate relief of symptoms with rapid healing, but in each eye there was a relapse after treatment which necessitated a second exposure. The patient has not come for examination for over a year so presumably has kept quite well.
13	A. B.	49	M.	Traumatic ulcer	2 exposures of 5 mgrm. for 5 minutes with an interval of 3 days	Cured	5 days previous to exposure the cornea was wounded by a chip of concrete. There was a large deeply staining abrasion roughly circular and measuring 5 mm. in diameter. The surrounding cornea was deeply infiltrated at two points. 3 days after the first exposure the staining area measured 1 mm. in diameter and 3 mm. in length. 7 days later the cornea did not stain and the patient was practically well.
14	F. W.	19	F	Dendritic ulcer of cornea	1 exposure of 29 mgrm. for 5 minutes	Cured	A typical case of dendritic ulcer. There was a history of a similar attack of inflammation of the cornea six years previously which had lasted for 4 months. The cornea presented several irregular wavy lines of grey ulceration which intersected here and there. A week after exposure there was no staining and no subjective symptoms and the eye seemed quite well.
15	A. G.	42	F.	Catarrhal ulcer of cornea	1 exposure of 5 mgrm. for 5 minutes	Cured	This patient had suffered from a relapsing conjunctivitis for 2 months. The ulcer formed a deeply staining, sodden spot near the limbus. As in other cases, all treatment except bandage and boric lotion and atropine was discontinued after radium, but the ulcer quickly healed. The lids, however, suffered a good deal from the bandaging and want of effective treatment, and subsequent astringent applications were necessary.
16	C. Q.	62	F	Deeply infiltrating yellow ulcer of cornea	2 exposures of 29 mgrm. for 5 minutes with an interval of 14 days	Failure	This case was complicated by the condition of the lids, which were in a very septic condition. The exposure in each instance caused a great deal of pain, lasting for some hours. After the first exposure the ulcer showed no tendency to spread, but it did not heal and a second exposure did not seem to benefit. A great deal of trouble was experienced in curing the lid inflammation, and under treatment in this direction the ulcer slowly got well.
17	S. G.	35	M.	Central corneal ulcer of traumatic origin	2 exposures of 29 mgrm. with an interval of 5 days; the first exposure was for 5 minutes and the second for 3 minutes	Cured	There was a history of injury 4 days previously. The cornea stained over an area measuring 2 mm. in length by 1 mm. in breadth, and there was a surrounding area of deep grey infiltration 4 mm. in diameter. The pupil was sluggish with marked ciliary injection. 5 days after the first exposure the ciliary injection was much less and the cornea did not stain. A few days later the patient was practically well.
18	M. R.	18	F.	Marginal keratitis	1 exposure of 29 mgrm. for 5 minutes followed by a second exposure a fortnight later of 29 mgrm. for 1 minute	Cured	There was a large area of the limbus of the cornea red and swollen with much photophobia and lacrymation but no staining. The first exposure caused much pain for 2 days, and then the eye began to improve rapidly and appeared almost well 9 days after exposure. No further radium was give for a further 5 days on account of the pain caused by first application. The second exposure was scarcely necessary, but the patient was then not quite well.
19	E. W.	15	F.	Interstitial keratitis, tuberculous; both eyes affected	Several exposures to doses varying from 49 mgrm. to 15 mgrm.	Doubtful	A most obstinate and difficult case. Patient had been under treatment at the Central London Hospital for 18 months before coming under observation, and had been attending Moorfields Hospital for over a year before radium was tried. At first radium seemed most successful and rapid improvement followed, but relief was not permanent. Successive relapses were treated, but beyond producing a temporary amelioration it is doubtful if radium proved of much service.
20	M. B.	24	M.	Interstitial keratitis; congenital specific disease	1 exposure of 15 mgrm. for 5 minutes	Improved	A typical case of specific interstitial keratitis. Had been treated for 5 weeks by the usual methods of fomentations, etc., but did not improve and subjective symptoms were acute. Rapid improvement set in at once after radium, and without any relapse the eye got well with barely a trace of corneal haze. About 6 weeks after exposure the other eye became affected and was *not* treated with radium. This eye has since made a good recovery, but though the disease did not run a more severe course there is a considerably denser resultant haze over the centre of the cornea.
21	A. R.	17	F.	Interstitial keratitis; congenital specific disease	5 exposures of 29 mgrm. for time varying from 3 to 5 minutes	Improved	The patient was convalescent from an attack of interstitial keratitis in one eye for which she had been treated for 6 months. The other eye then showed signs of a commencing attack, and it was resolved to try to abort the attack with radium. In this some success was certainly made. The symptoms seemed to come to a standstill, and at no period did this eye show any acute inflammation. Within 3 weeks the sclera was quite white, but a certain amount of corneal haze remained and still persists.

No.	Name.	Age.	Sex.	Nature of disease.	Number of exposures and dose.	Result.	Remarks.
22	N. W.	24	F.	Interstitial keratitis; congenital specific disease	8 exposures extending over 3 months, with doses varying from 5 mgrm. to 29 mgrm. applied for 5 minutes	Improved	Patient had been treated for 3 weeks on general lines before radium was tried. Symptoms were exceedingly acute, and patient grew continuously worse. It is difficult to say to what extent radium benefited, but certainly the case began to make rapid strides towards recovery after the first exposure, which was a cautious one of 5 mgrm. for 5 minutes. The exposures were then made almost weekly with increasing doses, and the patient thenceforward made steady progress without any relapse. A small dense central nebula persisted.
23	E. G.	15	F.	Interstitial keratitis; congenital specific disease	5 exposures extending over 5 weeks, with doses ranging from 15 mgrm. to 29 mgrm. applied for 5 minutes	Doubtful	A severe typical case of interstitial keratitis with intense photophobia and lacrymation. Improvement seemed at first to follow the exposure to radium, but a severe relapse set in a few weeks after the radium was discontinued, with recurrence of pannus and photophobia.
24	T. C.	7	M.	Interstitial keratitis; congenital specific disease	1 exposure of 59 mgrm.	Improved?	An unusually severe case of interstitial inflammation affecting both eyes. The child had been under treatment for 4 months before radium was used. Both corneæ were extremely opaque and vascular, but the child was steadily mending. The exposure was given to *one eye only* to compare results if any. No reaction followed the large dose employed, and the eye chosen was much the more opaque. The opacity in this eye appeared to clear much more rapidly after the use of radium than was the case with the other eye; but it is impossible to speak more definitely.
25	H. S.	26	F.	Recurrent episcleritos with sclerosing keratitis	1 exposure of 59 mgrm. for 5 minutes to the episcleral swelling	Cured	The present attack was the second in the right eye, and there had been a similar attack in the other eye. The inflammation had already lasted 2 months, and was accompanied by severe subjective disturbance. There was great injection, with deep violet discoloration and swelling. A fortnight's treatment on the usual sedative lines and salicylate of soda was tried without any improvement resulting. The exposure to the large dose of radium caused severe pain, and the sensation for an hour or so of almost continuous flashes of light proceeding from the side of the globe opposite to that treated. After exposure to radium all treatment was omitted. Two days later the patient was already much better. A week after exposure she was nearly well. She then contracted influenza, and there was a slight recrudescence of symptoms, but they soon passed away without any further treatment, and the patient made a steady convalescence. The patient has not been seen for nearly 12 months, and presumably has remained quite well. On account of the severe disturbance following the large dose of radium it was considered inadvisable to employ it a second time. Probably a quicker convalescence would have resulted after a second much weaker exposure.
26	H. M.	23	M.	Interstitial keratitis; congenital specific disease	4 exposures of 29 mgrm. for 5 minutes with intervals of 1 week	Failure	This was the worst case of its kind I have experienced. In spite of every kind of treatment that could be devised both corneæ sloughed, and one eye had to be removed. The other eye ultimately quieted down, but the whole cornea remained densely opaque. Radium was tried as a last resort in this eye, when the sloughing had ceased, in the hope of producing some clearing of the opacity. No reaction followed the exposures, but the treatment did not produce any noticeable result.
27	M. B.	29	F.	Keratitis profunda	4 exposures of 29 mgrm. for 5 minutes with intervals of 1 week	Much improved	A very interesting case. Five weeks previous to use of radium vision began to rapidly fail without apparent cause. There was a central grey plaque situated in deep corneal layers measuring 8 mm. in diameter. Surrounding cornea healthy. Subjective symptoms slight. Vision much affected. A month's treatment with fomentations, etc., had effected no improvement. A week after first exposure the plaque was smaller and less dense and vision improved. No reaction followed radium, which was continued for a month. Two months after last exposure an exceedingly faint nebula, about one third the size of the original plaque, was still visible.
28	S. C.	40	M.	Inflamed pterygium	6 exposures of doses varying from 39 mgrm. to 59 mgrm. extending over 3 months with about fortnightly intervals. No further treatment for about 4 months; then 3 further similar exposures during the ensuing 6 months	Cured	A most successful case. Patient had had 6 operations of transplantation during 3 years with no permanent benefit. When he first came under observation there was a very large, inflamed pterygium, forming a broad, succulent swelling, with large corneal involvement. The subjective symptoms were marked and the patient was in constant and extreme discomfort. The effect of radium was immediate and marked. No reaction or pain followed the large doses employed, but the inflammation and subjective symptoms rapidly subsided, and the pterygium began to shrink. After 3 months the bulbar conjunctiva had resumed its normal appearance, but over the corneal portion there was still a little juicy-looking swelling and some slight pannus. Nothing further was done for 4 months and no relapse occurred, but as a little pannus and swelling still persisted a few more sittings were given. At the present time no radium has been used for 4 months, and the patient is quite cured except for a slight degree of pannus at the corneal limbus.

No.	Name.	Age.	Sex.	Nature of disease.	Number of exposures and dose.	Result.	Remarks.
29	W. F.	31	M.	Bilateral pterygia partly cured by excision	1 exposure of 49 mgrm. and 1 exposure a fortnight later of 59 mgrm. applied through 13 mm. of lead foil	Cure completed	Patient had had successful operations for removal of large bilateral pterygia a year previously. The bulbar conjunctiva, however, remained red, rather chemosed, with continued irritability of both eyes, photophobia, and constant slight diplopia due to dragging of the conjunctiva on one side. The first exposure caused a good deal of intermittent pain for 2 days, and the second exposure was made through lead foil in the hope of preventing this from occurring again, and this was successful, as no pain was experienced. The first exposure produced rapid improvement in the subjective symptoms, and the eyes were much less red a week later. At the expiration of a fortnight the diplopia had quite disappeared, and the eyes were nearly white. The patient then went to West Africa, and was not seen for a year. On his return he stated that he had remained quite well for 6 months, but then slight redness of the bulbar conjunctiva on the right side appeared, and has continued ever since. The other eye remained permanently white and free from discomfort. Patient was just off again to West Africa, and nothing further was done.
30	J. W.	38	M.	Pterygium (not inflamed)	2 exposures of 29 mgrm. for 5 minutes with an interval of 1 week	Doubtful benefit	The patient was a captain in the Merchant Service, and had to return to sea before the effects of radium could be satisfactorily tested. No reaction or discomfort followed the exposures, and the pterygium seemed to us to be shrinking, but no positive statement can be made.
31	C. S.	48	M.	Inflamed pterygium	2 exposures of 5 mgrm. for 5 minutes with an interval of 1 week	Failure	A case of large pterygium, with extensive corneal attachment and considerable irritability of the conjunctival portion. It was resolved to see if small doses of radium would have any effect. No effect of any kind was noted, and we should have then proceeded to larger doses, but the patient presumably tired of the treatment and did not attend. The case is reported as evidence that probably large doses are needed to produce marked effect in cases of this sort.
32	L. B.	12	M.	Spring catarrh	8 exposures of doses varying from 39 mgrm. to 44 mgrm. and extended over 12 months	Cured	This case has already been fully reported (*vide* 'Trans. Ophthal. Soc.,' vol. xxix, p. 239). The length of time occupied by the treatment was due to caution through lack of experience. The boy has since remained quite well.
33	B. R.	30	M.	Spring catarrh	*Right.*—6 exposures to right lid extending over 4 months: 49 mgrm. for 20 minutes twice; 49 mgrm. for 10 minutes twice; 29 mgms. for 15 minutes twice *Left.*—Similar treatment to right.	*Right* cured *Left* improved	An extremely bad case, which had been under observation and treatment for over 3 years, without any benefit. The upper tarsus of each lid was extensively infiltrated with characteristic flat outgrowths. The right lid was treated first. Under cocaine, scissors were used freely to remove as much of the growths as possible, and to well freshen the surface. Very little could be got away. A week later 49 mgrm. were applied for 20 minutes, and the same dose and exposure was repeated again 3 weeks later. A month after the first exposure the condition was already much better, and then two sittings were given in one week of 49 mgrm. for 10 minutes. No more radium was used for a month, when one sitting of 29 mgrm. for 15 minutes was given. 2 months later a final exposure of 29 mgrm. for 15 minutes was made, the lid being then almost well. 6 weeks later the lid was examined, and no trace of the former trouble was apparent, the tarsus being quite smooth, without any appearance of cicatrix, except that there was a certain bloodless appearance in places. Treatment of the left was not commenced until the right lid was nearly well, and no previous shaving of the outgrowths was made. A similar method of treatment has been adopted in other respects. The lid is now practically well, but is still being kept under observation, and possibly one or two more sittings may be required. It may be mentioned that weak doses of radium (5 mgrm.) were tried 3 or 4 times without success before the patient came under our observation.
34	E. M.	40	F.	Rodent ulcer	3 exposures of 16 mgrm. for 10 minutes, the first 2 exposures with a week's interval, and the third about a month later	Cured?	A small rodent ulcer, situated on the face about 1 inch below the inner canthus. It was freely excised, but there was an obvious return of the disease in the scar a few weeks later. The patient was then sent for treatment by radium. No reaction until a week after the second exposure, when the scar was raised and reddened, and there was some pricking pain. This subsided in about a fortnight, leaving the scar white, supple, and free from infiltration. The patient was last seen 6 months later, and has remained free from recurrence.
35	F. K.	77	M.	Rodent ulcer	2 exposures of 29 mgrm. for 15 minutes, with an interval of 1 week, and a third exposure of 29 mgrm. for 10 minutes about a month later	Cured?	Typical rodent ulcer, involving whole of lower ciliary border, with much loss of surface at inner canthus, where the ulceration is severe. 8 weekly applications of 5 mgrm. for 5 minutes had been given before the case came under our observation. Some benefit to the outer portion of the growth had resulted, but the inner worse part had not improved. The condition was much improved a week after the first exposure to the larger dosage, and the ulcerated area thenceforward rapidly cleared up. 2 months after the first exposure he seemed to be cured, and a supple scar was alone to be seen. Patient has not since reported himself.

No.	Name.	Age.	Sex.	Nature of disease.	Number of exposures and dose.	Result.	Remarks.
36	O. S.	7	F.	Small nævus on cheek just below lid margin	2 exposures of 29 mgrm. for 10 minutes, with a fortnight's interval	Cured	No reaction for about 3 weeks after the first exposure, when the spot became redder and inflamed. Repeated small superficial scabs then formed and re-formed, with final healing delayed for a few weeks. 6 months after treatment the only indication of the trouble is a minute pink speck surrounded by a small area of blanched skin.
37	M. M.	14	F.	Pigmented papilloma of ciliary border	2 exposures of 29 mgrm. for 11 minutes with a week's interval	Cured?	A hard, nodular, pigmented swelling noticed for about 2 years, and though small, causing considerable disfigurement. Reaction to radium first noticed a week after the second exposure, when a scab had formed with a mild surrounding inflammation. No further radium was given as reaction was rather severe. A month later there was still a vestige of the growth left, but shrinkage was going on. The ciliary border on each side of the growth was entirely denuded of lashes.
38	M. A.	19	F.	Granuloma of lower lid	2 exposures of 29 mgrm. for 5 minutes with 1 week's interval	Cured?	For 7 or 8 months an increasing growth had been noticed on the palpebral surface of the lower lid. It formed a round sessile tumour, smooth on surface, which was covered by conjunctiva and apparently growing in connection with the tarsus. It was very hard to the touch and painless in character. A piece removed showed it to be composed purely of granulation tissue. 10 days after the second exposure the tumour had almost disappeared. The effect of radium in this case was simply to produce a rapid shrivelling of the growth. The patient was last seen a month later, when there was still a vestige remaining, consisting of a flat scar, but no obvious growth.
39	E. W.	37	F.	Angioma of ciliary border	3 exposures of 29 mgrm.: 1st exposure for 25 minutes, 2nd exposure a week later for 15 minutes, 3rd exposure 7 weeks later for 15 minutes	Much improved	A blood-cyst measuring 5 mm. in diameter and elevated about 2 mm. above the ciliary border. Noticed for 10 years, and lately increasing in size. It produced great disfigurement. Reaction was first noted 3 weeks after the first exposure, when a crust had formed over the angioma, which had shrunk considerably. A fortnight later the crust came away, leaving an inflamed scar. A month later the lid had quite healed, but as there was still a small but definite remnant of the growth radium was used once more. When last seen there was still a very small red swelling with the lid border denuded of lashes in the neighbourhood. It was not deemed advisable to use radium again.
40	H. R.	44	M.	Trichiasis (old trachoma)	—		These 3 cases were examples of that variety of trichiasis where the lashes as a whole do not brush the cornea, but where there are a few or several very fine downy colourless cilia scattered along the lid margin and setting up much irritation. Electrolysis is extremely difficult, and the lashes are so fine that the patient or friends cannot see to pull them out for themselves. An attempt was made to deal with the difficulty by treating the lid border with radium applied directly to the faulty lashes. The trials given were not a success. To ensure a good result a long and direct exposure is necessary, and after several endeavours it was found practically impossible to directly apply a tube of radium to a fine lash for a period of 15 minutes. Further, the lashes in the immediate neighbourhood are apt to suffer, so that a patchy baldness of the ciliary border may be produced in the attempt to rid the lid of one or two fine hairs.
41	M. B.	76	F.	Ditto	—	Failure	
42	E. H.	46	F.	Ditto	—		
43	A. M.	14	M.	Large and dense central corneal nebula	Several exposures in each case to both large and small doses	Doubtful	These 4 cases represent an attempt to deal successfully with the amblyopia caused by central corneal nebulæ. It is difficult to express an opinion as to the value of the treatment. In each case the patient after a few sittings expressed himself as being able to see more, and in Cases 43 and 46 there was definite objective evidence that the nebula was less dense. Attempts, however, to measure improvement in vision by test-types did not show conclusive proof of amelioration. It is certain that if any success is to follow the treatment of corneal scars by radium the exposures must be continued over a long period of time, and the dosage must be fairly large.
44	W. B.	50	M.	Ditto			
45	M. W.	31	M.	Ditto			
46	W. S.	24	M.	Ditto			

SERUM-ANAPHYLAXIS: A CASE ILLUSTRATING ITS POSSIBLE GRAVITY.

By A. BANKIER SLOAN, M.D.,

DISPENSARY PHYSICIAN, WESTERN INFIRMARY AND ROYAL HOSPITAL FOR SICK CHILDREN, GLASGOW.

THE subject of serum-anaphylaxis is one that deserves the closest investigation. The leading article in the BRITISH MEDICAL JOURNAL of May 21st attracted my attention and reminded me of a case I had under my care in 1903, which I have often thought of reporting. I now put the facts of the case on record on account of the importance of the condition it illustrates and in view of the statement made in the said article that certain authorities hold "that serum-anaphylaxis in man gives rise to transient symptoms only, and never to dangerous or permanent consequences."

My case at the time of its occurrence was a complete mystery to me, and, although I did hear at the time that at least one other similar case had occurred in a Metropolitan Asylums Board hospital, no one to whom I referred could throw any light on the causation of the symptoms. It has been, however, for some time quite clear to me that the condition was due to anaphylaxis.

The patient was under my care in the Western Hospital, Fulham, one of the Metropolitan Asylums Board hospitals, and the facts are as follows:

H. C., aged 3½ years, was admitted to the Western Hospital on January 30th, 1903, suffering from faucial and nasal diphtheria. The faucial involvement consisted of swelling of the tonsils and the presence of patchy membrane; there was considerable rhinorrhoea; the glands at the angle of the jaw were not markedly swollen. The child received 12,000 units of diphtheria antitoxin (volume of serum about 30 c.cm.) on admission, and 12,000 units the following day, as, although the membrane on the fauces was not extensive, the child seemed moderately ill.

His recovery during the following week was unduly slow, his temperature keeping up in a way which to me did not seem quite accounted for by the local conditions. He had during this time a little bronchial catarrh.

On February 10th some punctate erythematous rash appeared on the trunk and face; there was a tendency to factitious urticaria; the lymphatic glands generally were rather enlarged. The following day the glands at the angle of the jaw were distinctly swollen and tender, and the evening temperature was 104.6° F. By the 13th a typical measly serum rash had developed and the face was slightly swollen. This rash was intense on the 14th, being distinctly haemorrhagic in character on the right hand and left leg. It was also noticed that although the throat was generally quiet the left tonsil showed a patch of haemorrhage.

Between the 11th and 16th the temperature was never below 101° F., and varied between that and 104.6° F. as a maximum (Chart 1); during this period the child was sharply ill.

His convalescence was slow for the type of diphtheria he suffered from, and this was due, I think, to the severe serum reaction. By March 16th he had only been out of bed for a few days.

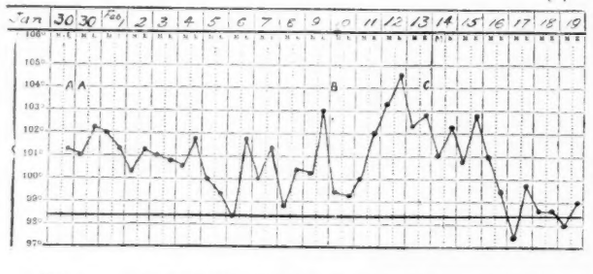


Chart 1.—A, 12,000 units A.T.; B, rash; C, rash, haemorrhagic.

On the evening of March 16th his temperature rose to 103.6° F., and examination of the throat showed a patch of distinct membrane on the posterior pharyngeal wall. On account of his previous severe serum reaction no antitoxin was given that night. Next morning, however, as a small patch of membrane was present on each tonsil in addition to that on the pharynx, 12,000 units of antitoxin were administered at 12 noon. At 1.15 p.m. I got an urgent message from the staff nurse to come and see the child, as he was very ill. When I arrived immediately afterwards I found him ghastly pale in colour, anxious-looking, shivering, covered with a cold, clammy sweat, and almost pulseless. His condition was so urgent, and to me so unaccountable, that I at once sent for a colleague to see him with me. Fortunately, after the application of heat and the use of brandy and strychnine, he gradually warmed up and rallied somewhat. Marked urticarial rash appeared by 2 p.m., causing swelling of the face.

During the following night he was very restless and vomited frequently. On the morning of the 18th, although he was better, neither the radial pulse beats nor the cardiac sounds could be counted accurately owing to their great frequency. It was noted that subcutaneous haemorrhage had occurred around the seat of injection.

By the 19th he was considerably better, vomiting had ceased, and the heart-rate was 132 per minute. From this time onwards the boy very gradually improved; the temperature, however, did

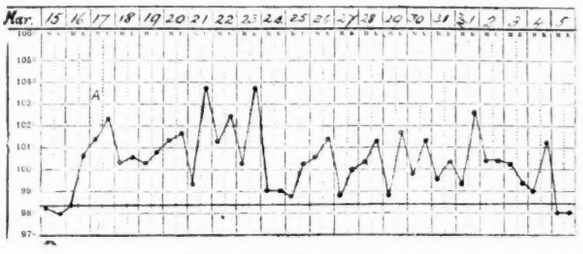


Chart 2.—A, 12,000 units A.T.

not settle to normal level till April 5th (see Chart 2), and three weeks after the start of the relapse. Induration was present at the seat of injection for fully a fortnight. He suffered during his convalescence from mild suppurative adenitis and right suppurative otitis media.

In passing, I would remark that a second attack of diphtheria following so closely, as in this case, upon a first is very rare. In this connexion the question as to the first attack being true diphtheria might be raised. I must admit that a bacteriological examination was not made, but on the admission of the patient in my own mind I had no doubt as to the diagnosis.

It is interesting to note that during the first attack from the outset I had an impression that the serum was distressing the child, and when the real reaction did appear it was, as above noted, very marked.

The chief point of interest, however, in the case was the occurrence of sudden collapse after the injection of serum at the onset of the second attack. As stated above, at the time the cause of this was to me a mystery. In the light of further knowledge, however, and for the following two reasons, I have no doubt that the grave condition was due to serum-anaphylaxis: (1) The collapse occurred within two hours of the injection without other apparent cause and while the child was lying quietly in bed; (2) the collapse was accompanied by the almost simultaneous appearance of a marked serum rash of the urticarial type. Apart from the twenty-four hours' urgent illness following on the injection, I also think that the prolonged febrile period thereafter and the slow convalescence were chiefly due to the serum phenomena.

If my conclusion, that the very grave condition of my patient was due to serum-anaphylaxis, is right, then it must be admitted that serious results may occur from anaphylactic phenomena.

It is, therefore, of the greatest moment from a clinical point of view that we should know more about the exact conditions under which the phenomena are likely to occur. This is specially important in view of the fact that foreign serums are now being put to such diverse uses. Anti-diphtheritic serum in addition to being used as a curative agent in diphtheria is used as a prophylactic agent for the same disease, is recommended as an antituberculous measure (Montgomery Paton), is used by some for asthma, and finally (a special serum) is used by a Paris physician for the treatment of diphtheritic paralysis. The latter proceeding, in view of the possibility of anaphylaxis occurring, would suggest itself to one as being specially open to objection when one remembers the weak condition of many patients suffering from diphtheritic paralysis.

In conclusion, it is my opinion that, until we have more accurate knowledge of the circumstances bringing about anaphylaxis, we should be particularly cautious not to inject foreign serums without good reason, because we may by doing so render our patients so sensitive that a future necessary injection may cause grave consequences.

SEVENTY-EIGHTH ANNUAL MEETING
OF THE

British Medical Association.

Held in London on July 22nd, 23rd, 25th, 26th, 27th, 28th, and 29th.

PROCEEDINGS OF SECTIONS.

SECTION OF BACTERIOLOGY.

CHARLES J. MARTIN, M.B., D.Sc., F.R.S.,
President.

DISCUSSION ON RECENTLY ACQUIRED KNOWLEDGE CONCERNING THE BIONOMICS OF PATHOGENIC ORGANISMS AND ITS BEARING ON THE SPREAD OF DISEASE.

OPENING PAPERS.

I.—A. C. HOUSTON, D.Sc., M.B., C.M.Edin.,
Director of Water Examination, Metropolitan Water Board.

I VENTURE to think that in the past we have been attaching, consciously or unconsciously, far too much attention to dead matter and the passive transmitters of disease—namely, soil, water, air, and foods—and have been bestowing far too little consideration on the living storehouses and factories of pathogenic bacteria. Soil, water, air, and foods may, it is true, be teeming with life, chiefly of an adventitious sort, but, in contradistinction to "living carriers," these agencies (as such) should, I think, be regarded as dead and merely passively concerned in the propagation of disease. It needed the work of men like Manson, Ross, Bruce, Horrocks, Shipley, Nuttall, and Sambon, to mention but a few names, to bring home to us the insufficiently recognized part played by living creatures in the propagation of disease.

Let me cite a few examples of diseases (not all, however, of microbial origin) which have been either stamped out, or at least their incidence greatly diminished, by attacking the living agencies which fostered their spread. Rabies is no longer regarded as a mysterious disease arising out of some climatic combination of circumstances. The Muzzling Order has served to stamp out a disease which, while not very common, was yet so dreadful in its ending as to prove a nightmare to a great many people. The great part played by Mr. Walter Long, then President of the Board of Agriculture, should not be forgotten in this connexion. Malaria, to take another instance, has ceased to be associated with lethal vapours arising from swampy ground. Drainage, petroleum, and the mosquito-net have robbed this disease of most of its terrors. So also Malta fever is no longer a subject for vague epidemiological generalities and hypotheses. The "banning" of the infected goat has revolutionized the whole history of this complaint. To those who regard bacteriologists as faddists, and vivisectors as active demons of cruelty, I commend an unbiassed study of the work of the Malta Fever Commission. The work of Bruce and Horrocks and their colleagues has practically resulted, as I am informed, in a saving to the nation of £40,000 a year, not to speak of the stamping out of a chronic disease entailing much suffering now known to be preventable; and just recently we are learning that pellagra is not, as was supposed, caused by the consumption of diseased grain, but by a species of sand-fly. The foregoing are only a few illustrations of the extreme importance of seeking out and, if possible, of annulling the baneful influence of these living creatures which act as storehouses or factories of disease.

I propose to deal with the subject-matter of this discussion under two headings: (1) The dead and merely passive transmitters of disease; (2) the living storehouses or factories of disease.

I.—*Dead and Merely Passive Transmitters of Disease.*

(*a*) *Soil.*—Belief in the influence of soil as a propagator of disease dates back to times immemorial, and even within recent times polluted soil has been the sheet anchor of many epidemiologists. Nearly all soil in the neighbourhood of dwellings is necessarily more or less contaminated, yet this factor has been used on the most slender evidence as explaining the cause of epidemics of obscure origin—epidemics which would still have remained obscure if the soil, as such, had been even ten times more polluted than was actually the case. Putting on one side sporing microbes such as anthrax and tetanus, the most trustworthy evidence nowadays tends to show that pathogenic bacteria not only do not multiply in soil, but that they undergo therein a process of gradual extinction. It is, of course, not suggested that polluted soil or dust, gaining access to food or water supply are not dangerous, but it is exceedingly difficult to believe that soil acts as an active breeding ground for pathogenic microbes, or that in the absence of fresh pollutions it can remain indefinitely infective. The danger of a polluted soil and subsoil rests, in my opinion, almost solely on the possibility of water or food becoming accidentally infected therefrom.

(*b*) *Air.*—In diseases of proved microbial origin, apart from the setting free of "droplets" of saliva and the detachment perhaps of particles of scurf, it is difficult to see how a patient can continuously produce an infective atmosphere, even in his immediate environment. Nowadays increasing importance is justly assigned to personal contact and "carriers." No doubt many cases attributed to atmospheric influences were in reality infected in this manner. Whatever views are held on this subject, all of us will agree that microbes are not "chained down to points in space." We shall also probably agree that pathogenic bacteria do not multiply in the air, and that the air, as such, is not the factory responsible for bridging over the gap between one epidemic and the next. With reference to the setting free of "droplets" of saliva inside a certain zone of influence, and the bacteriology of air generally, Mervyn Gordon's most interesting experiments deserve special mention.

(*c*) *Defective Drains, Sewer Air, Foul Smells, etc.*—Assuming that leaking drains do not cause the contamination of drinking water or of food, their influence on the spread of disease seems very problematical. Nervous persons with hypersensitive imaginations can no doubt work themselves into a state of ill-health by worrying over bad smells, otherwise I believe the malignant influence attributed to foul odours has been grossly exaggerated. Haldane, Andrewes, Horrocks and others have carried out most exhaustive researches as regards sewer air. Whilst not denying the possibility of disease organisms being at times conveyed by this means, the extreme improbability of sewer air being a factor of much importance is the view which rests on the foundations of fact and common sense. Sewer air (in the absence, at all events, of much splashing and bursting of bubbles) not only contains very few microbes, but excremental bacteria are almost entirely absent. Sewage contains hundreds of thousands of *B. coli* in every cubic centimetre, and even if it also contains specific bacteria, it is only reasonable to suppose that the latter are present in infinitely smaller numbers than *B. coli*. If sewer air, then, were charged with *B. coli* the occasional accompanying presence of specific bacteria might be conjectured. But knowing that it is not, I can only regard the attributing of *direct* pathological significance to sewer air as a fetish of the past.

(*d*) *Water.*—The dangerous part that may be played by water in transmitting disease is now acknowledged by every one. But it is important to bear in mind that pathogenic bacteria not only do not multiply in water, but tend fairly rapidly to lose their vitality. One reason why the consumption of sewage-polluted river water after filtration is so seldom followed by apparent evil consequences may really be, not because the filtration process is invariably perfect, but that the water *antecedent to filtration* is *comparatively* innocuous. In the absence of convincing evidence to the contrary, I regard sand filters as mechanical devices which bring from 2½ to 5 pints of filtered water to the same plane of bacteriological quality as 1 oz. of unfiltered water. The history of the search for *B. typhosus* in water is an interesting one. In 1905

Willson published a striking paper,* in which he pointed out that he had been able to collect only 6 cases in which the *real B. typhosus* had been isolated from water. All these cases occurred abroad, and the water in 4 out of the 6 cases was from wells. If Willson was writing a similar paper in 1910, it appears to me not unlikely that his story would remain much the same. An eminent Frenchman once warned his students that in scientific research, unless they were very careful indeed, they would find what they were looking for. This, it is to be feared, is precisely what has happened in water bacteriology, and it is a matter for much regret.

Reverting to the question of sewage-polluted waters in general, and the presence of pathogenic microbes therein, it may be of some interest if I give a brief account of my own experiences. During 1907 and 1908 I examined 156 samples of sewage-polluted river water, using tried methods, which allowed of the vast majority of "water microbes" being excluded from consideration. The result was that out of 7,329 *selected* microbes, not one could be identified as *B. typhosus*. It is perfectly easy, however, to isolate from almost any impure water some microbes which will pass muster as the typhoid bacillus, according to the standards for identification adopted by some workers.

At the time of writing this paper twenty-four additional experiments have been carried out. Each sample of water was divided into two equal portions of 500 c.cm. (A and B). The A sample was artificially infected with a definite number of typhoid bacilli and Gaertner's bacilli. Both samples were next separately centrifugalized, the deposit spread over a similar number of plates, and the same number of colonies subcultured in each case. In brief, apart from the infection of the A sample, both samples were examined in a precisely similar manner.

As regards the A (artificially infected) samples, the *average* number of typhoid bacilli and Gaertner's bacilli added per c.cm. of the water was 2.242 and 0.686 respectively. The average number of these pathogenic microbes isolated was 14.54 and 12.417 respectively, a result which shows that the methods adopted were not at fault. By inference it may be concluded that it is possible to isolate the typhoid bacillus and Gaertner's bacillus when present in the proportion of 1 typhoid per 7 c.cm. and 1 Gaertner per 18 c.cm. of water.

As regards the B (non-infected) samples the same number of subcultures (5,451) yielded results as follows: As many as 5,449 of the microbes were neither the typhoid bacillus nor Gaertner's bacillus. Of the remaining two, one could not with certainty be differentiated from Gaertner's bacillus, and the other was almost, if not quite, indistinguishable from *B. typhosus*. Even if we accept these two microbes as of pathological significance, it is obvious that typhoid and paratyphoid bacilli are very rare in sewage polluted river water, and that thousands of subcultures are required to demonstrate even a single one. The following is a description of the chief morphological and biological characters of the two microbes referred to:

The Gaertner-like microbe is a small rod-shaped actively motile bacillus, which is agglutinated with anti-Gaertner serum. It produces gas in mannite and dulcite media, but no gas in a gelatine medium containing glycerine, raffinose, salicin, saccharose, adonite, and lactose. The surface growth on gelatine is less transparent and more slimy-looking than that of the classical Gaertner's bacillus. It forms no indol in peptone cultures. It produces alkali in litmus whey and litmus milk cultures. There is no liquefaction of gelatine. The typhoid-like microbe is a small multiflagellated rod-shaped, actively motile bacillus, which is agglutinated with antityphoid serum in high dilutions. An animal immunized with it yields a serum which agglutinates in high dilutions both itself and the typhoid bacillus about equally well. It produces acid but no gas in Proskauer and Capaldi's No. 2 medium, and in the No. 1 medium no change occurs. In a mixed lactose, saccharose, dulcite, salicin medium no change occurs. No indol is produced in peptone cultures. In litmus milk there is slight acidity produced, but no clotting of the medium. There is no liquefaction of gelatine. In glucose neutral red broth cultures a purplish tint is produced, but no gas or fluorescence. In media containing separately sorbite, mannite, glucose, levulose, galactose, and maltose, acid but no gas is produced. In media containing separately inulin, inosite, saccharose, salicin, adonite, lactose, dulcite, and raffinose no change occurs. It reduces nitrates to nitrites. Voges and Proskauer's test yields negative results. No visible growth occurs on potato.

Excepting these two microbes, I have never been able to isolate from water any microbes which could not readily be differentiated from the typhoid bacillus and Gaertner's bacillus. One great fallacy in connexion with typhoid work is that a large number of "water microbes" are very feeble gas producers, and, when grown in liquid sugar medium, no gas is visible in the inner inverted tube. In many such cases, however, on tapping the tube smartly with a flat piece of wood, a cloud of bubbles rise to the surface.

But really the best way, in my experience, of demonstrating the capacity of such microbes to form traces of gas is to use not liquid but solid gelatine sugar tubes, incubating the cultures for three to five hours at 37° C., and thereafter for one to two days at 20–22° C. I could cite hundreds, and even thousands, of instances in which microbes which failed to show any visible gas formation in Proskauer and Capaldi's No. 2 medium, yet gave abundant gas in solid gelatine sugar media. All those who pay attention to this important technical detail will save themselves a vast amount of unnecessary labour, and will at the outset be able to exclude microbes which otherwise might give rise to a great deal of confusion and trouble.

It must not be supposed from what has been said that I am endeavouring to show that sewage-polluted river waters do not at any time contain pathogenic bacteria. All that I wish to point out is that, according to my experience, they can only be present infrequently, and only in small numbers. The satisfactory health statistics not uncommonly noticed in the case of towns whose drinking waters are of this class may be due more to this circumstance than to the efficiency of mere sand filters. Epidemics occurring in the case of such towns may be really due, not to any temporary inefficiency or breakdown of the filtration plant, but to the unfiltered water becoming suddenly and accidentally grossly polluted with infective material, or to some accidental contamination of the supply after filtration.

Turning our attention next to sewage, the question may be asked whether even the crude sewage of a large town is invariably so dangerous a substance in small amounts as is commonly supposed, or whether it really plays a large part in spreading disease. It is quite possible that it is less constantly harmful than is generally conjectured, because it is difficult to imagine any continuous source of supply of specifically infective material rendering it necessarily and uniformly dangerous even in small amount. The sewage of a town of 100,000 inhabitants amounts to about 3 million gallons daily. If it is reasonable to assume that the urine and faeces of persons who have *never* contracted typhoid fever is specifically non-infective, the whole burden of rendering the 3 million gallons daily specifically infective rests on those persons who are actually suffering from typhoid fever or who have at one time so suffered. I ask these questions to stimulate useful discussion, and it must not be supposed that my own mind is at all clear as to the proper answer.

(*e*) *Solid Foods.*—Solid foods (excluding for the moment shellfish) would not seem to play any very large part in the propagation of epidemic disease. Vegetables, however, eaten in the uncooked condition and grown in sewage-polluted soil or water are potentially dangerous. Solid foods may also be infected by contaminated dust or by flies carrying infectious matter. Whatever be the infection conveyed to solid food it is probably limited to the actual dose of infective material, for the reason that it is unlikely, generally speaking, that multiplication takes place. In regard to shellfish, there is strong evidence as to the danger of eating shellfish grown or laid in sewage-polluted waters. As a rule, the degree of pollution of the water in which shellfish are grown or laid is not excessive, but I have found by numerous comparative experiments that, per unit of volume, an oyster is vastly more impure than the water surrounding it. Shellfish are undoubtedly "concentrators" of pollution. Apart from its brackish character, I would much rather drink a litre of the water in which oysters were growing, than eat a single one of the oysters themselves.

(*f*) *Liquid Foods.*—Liquid foods stand in a separate category from solid foods in relation to the spread of disease. Here actual multiplication *may* take place, and

* The Isolation of *B. typhosus* from Infected Water, with Notes on a New Process.

so greatly increase the danger of widespread infection. Moreover, certain kinds of liquid food (such as milk) are exposed in a special degree to the risk of undesirable pollution. Nevertheless, the milk of a perfectly healthy animal is practically germ-free as secreted, and any risks involved in the consumption of milk must be due either to accidental contamination or to the animal secreting the milk being in a diseased condition. At the recent tuberculosis conference at Edinburgh I understand that most speakers admitted the relatively infrequent occurrence of bovine infection and considered that man was especially infected by man, the infection usually being aëro-lymphogenous. In summary at this stage, I have endeavoured to suggest that perhaps too much importance has been attached to those agencies which, in the main, act chiefly as passive transmitters of disease.

Is the belief not permissible that all the agencies I have considered would cease to be operative in carrying on the work of infection if it were only possible to exclude from our environment all the living creatures who are suffering, or have at one time suffered, from infectious disease, or which, although not themselves sufferers, yet store in their bodies the germs which are infective to others?

II.—*The Living Storehouses or Factories of Disease.*

If the agencies previously considered play no more than a passive part in the propagation of disease, where are the active repositories of infections to be found? Unquestionably, I think, as already suggested, in living creatures who are suffering, or who at one time have suffered, from infectious disease, or which, although not themselves sufferers, yet store in their bodies the germs which are infective to others. If the tendency in soil, water, and air is towards the destruction of pathogenic bacteria, it is only reasonable to turn to *living* matter as the probable factory which keeps infectious matter alive, and to regard infected living creatures as the "carriers," which probably serve to bridge over the gap between one epidemic and the next.

Of course, with some diseases, the virus may be specially resistant, and retain its infective qualities for long periods, until, indeed, the chance is afforded of its re-entry into a suitable and susceptible host. Even with some diseases of known microbial causation such things occur. We know, for example, that anthrax and tetanus infected soils are almost permanently dangerous. But I am not suggesting that dead matter plays no part in fostering contagion, or that the living "carrier" is necessary for all diseases. I am merely advancing the opinion that in the past we have attached, generally speaking, too much importance relatively to the former and too little to the latter.

Within recent years we have learnt that flies and insects (using these terms in their broadest sense) play a most important, and, indeed, vital, part in the propagation of certain diseases. Niven, Hamer, Graham Smith, and others have specially studied the question of house flies as carriers of infection, and I have heard it suggested that there is some experimental evidence to show that flies may not only act as passive carriers of filth from one place to another, but actually allow of the *multiplication* of pathogenic bacteria in their interior. If this is confirmed, then these pests of civilization acquire an importance not hitherto assigned to them, and every effort should be made to effect their destruction. Apart from this, I find it not a little difficult to understand from whence flies derive their infectious matter, if we regard the excretions of *healthy* persons as specifically non infectious.

Within recent years we have come to learn that a considerable proportion of those who have contracted typhoid fever harbour the typhoid bacillus for indefinite periods, and therefore are apparently a permanent menace to the community. Such persons would seem, in the truest sense of the words, to be living manufacturers of enteric fever. As regards the search for these individuals and the feasibility of annulling their dangerous influence, I must leave those to speak who have made this difficult subject their special study. Further, I can only make a passing mention of the important question as to whether the excreted bacilli vary in virulence either seasonally or occasionally.

But I would like to point out that as typhoid is not the only disease liable to be spread by carriers, the time is ripe for reconsidering the question of how far infectious diseases generally are spread in this manner. I trust that some of those who take part in the discussion will deal not only with typhoid fever, but with other diseases known or suspected to be spread by carriers—for example, dysentery and diphtheria. It is possible that we may not be spending too much time and money on the purification of impure substances, on the protection of pure materials from contamination, and on the avoidance of dangerous surroundings; but it is quite certain, in my opinion, that as a nation we are devoting far too little attention to the attempt to discover and render inoperative the living storehouses and factories of disease which alone seemingly are responsible for rendering undesirable but harmless pollutions specifically dangerous.

At all events, it appears to me that work on these "living lines" affords the best hope for progress in preventive medicine. It may be urged that these preventive measures are wellnigh impossible, but it must not be forgotten that the same hopeless attitude used to be adopted in regard to rabies, malaria, and Malta fever. At all events, until we realize and can trace out more fully the part played by living creatures in keeping alive the germs of disease, and study this subject systematically from the point of view I have indicated, we are really not in a position to speak either of impossibilities, or even of improbabilities.

II.—Professor Dr. OTTO LENTZ,

Chief of the Department of Epidemic Diseases at the Royal Institute of Infectious Diseases in Berlin.

THE ORGANIZATION AND RESULTS OF THE TYPHOID CAMPAIGN IN SOUTH-WEST GERMANY,

WITH SPECIAL REFERENCE TO TYPHOID CARRIERS.

AFTER Robert Koch had obtained such brilliant results in his systematic campaign against cholera and malaria, he felt encouraged to take active measures against typhoid fever. With the help of the authorities, a total of eleven bacteriological stations, each fully equipped for the campaign, was organized in the Prussian district of Frier, in the Bavarian Rheinpfalz, in the Oldenburgian principality of Birkenfeld, and in the territory of Alsace-Lorraine.

The scientific direction of the typhoid campaign was entrusted to Professor Frosch, while in order to unify the relationship of the stations to the State and communal authorities, an Imperial Commissioner and a Land Commissioner (for the Bavarian Rheinpfalz)—both higher officials—were appointed. At each station was placed a director, having under him from one to three bacteriological assistants and one or two laboratory attendants.

These stations have four duties:

1. To assist the practitioners in the diagnosis of typhoid.
2. To ascertain the source of infection, to render it innocuous, and seek out infected persons at a distance.
3. To be on the look-out for unhygienic conditions.
4. To determine, by repeated examination of stools and urine, when convalescents cease to eliminate typhoid bacilli, in order to prevent them from transmitting the disease.

The carrying out of all the necessary measures is naturally only made possible by having the stations work hand in hand with the official medical men of each district. To them they communicate the positive results of their examinations as well as their observation of unhygienic conditions. They make their investigations in company with them whenever possible. These official physicians have the power of causing the isolation of the sick or their transference to hospitals, and carry out both disinfection at the bedside and the final disinfection. They see also to the removal of unhygienic conditions, and must take special care that the precautionary measures ordered are not relaxed till it has been definitely settled by bacteriological examination that the convalescents eliminate no more typhoid bacilli.

This latter is regarded as proved if, after the patient has become completely afebrile, two bacteriological examinations, made eight days at least apart, no longer show typhoid bacilli in the stools and urine.

Of special importance is tracing of the sources of infection and unknown infected individuals. It was very soon evident that the typhoid reports of the practitioners were often merely indices which only needed to be followed up to establish a larger number of typhoid cases. Thus it frequently happened that when 1 or 2 typhoid cases were reported, 10, even 20, additional cases might be discovered; in one instance Professor Frosch discovered 73 cases of typhoid in a place in which only 7 were reported. The cause of this discrepancy lies in the fact that on the one hand many patients, especially those in the country, do not consult a physician, while on the other the clinical diagnosis of typhoid fever is often beset with extraordinary difficulties.

In these systematic investigations a perusal of the lists of school absences, sick cases, and deaths proves of great assistance; through them many valuable hints were obtained which led to the discovery of unknown typhoid cases. Whenever it was possible the examination of suspected persons was immediately undertaken, through the examination of a blood specimen and if possible of a stool, in addition; which the patient sent in a case supplied by the station. The data so obtained gave the occasion to set up investigations in the houses of the parents and relations of the suspects, and thus to widen the scope of the inquiry. The stations were also indebted to the communications of the local authorities, teachers, and ecclesiastics for much valuable information.

The typhoid crusade, the organization and method of work which I have briefly sketched here, has brought to light many significant facts. First of all, it was only natural that from it the bacteriological diagnosis of typhoid should receive a great stimulus to which we owe the working out of a large number of now well known methods. I mention here besides the Drigalski-Conradi and the endo-agar methods, which were already known at the beginning of the typhoid campaign, and which by the way have excellently stood the test of time, the widespread use of malachite-green-agar of Lentz and Fietz, the coffein-agar of Gacthgens, the brilliant green acid agar of Conradi, the malachite-green-bile-agar of Badlewsky, and the bile method of Conradi—all methods which have extraordinarily advanced the diagnosis of typhoid.

The constant control of the clinical picture by bacteriological methods, and the investigation of cases in which there was only a slight suspicion of typhoid, have caused our knowledge of the pathology and the clinical symptoms of typhoid to undergo manifold changes. Thus, the presence of typhoid bacilli in the roseola, in the urine and bile, and their frequent demonstration in the patient's blood, pointed with ever-increasing force to the fact that typhoid was not at all, as was previously thought, simply an intestinal disease, but a general septic infection. Though admittedly the most frequent, yet the lymphatic apparatus of the intestine is not always the portal of entry; of great significance are the observed cases of tonsillitis, especially in the beginning of the sickness (according to v. Drigalski, in 40 per cent. of the cases), in which myself and others have been able to demonstrate in the tonsillar scraping that the lymphatic apparatus of the upper digestive tract may likewise be the portal of entry.

Multiplication of the typhoid bacilli does not, as was formerly generally held, take place in the intestinal contents; on the contrary the sequence seems to be that the bacilli are carried into the bile by way of the blood stream, and with the bile eliminated in large numbers into the intestine, and then, as v. Drigalski and Fürgens have shown, gradually perish in the lower intestine. This explains why in typhoid cadavers so many typhoid bacilli are present both in the gall bladder (Chiari, Neufeld, Klinger) and upper intestinal segments (v. Drigalski, Fürgens, and others), and why at times their demonstration in the lower intestine is so extraordinarily difficult. That, indeed, the typhoid bacilli found in the blood are carried into the bile, and with it eliminated into the intestine, both Doerr and Hoffmann have demonstrated by animal experiments.

Through the work of the typhoid stations, the classical clinical picture of typhoid underwent a very essential alteration. Already, Griesinger, in Virchow's handbook of the special pathology and therapy, had alluded to the fact that during a typhoid epidemic, side by side with the well developed cases of typhoid a series of lighter cases always ran parallel, which though differing markedly from the picture of true typhoid, nevertheless are to be included with it. These wholly forgotten observations of Griesinger regarding such cases were completely verified through the bacteriological demonstration of typhoid bacilli or a positive Widal reaction. The large number of systematic investigations which we have carried out in the neighbourhood of typhoid cases have taught us that the disease presents most varying pictures—from simple sore throat to pneumonia, from a mild gastric catarrh to perforated peritonitis, from a slight headache to meningitis—may all owe their existence to an infection by typhoid bacilli. Moreover, the so-called cardinal symptoms of typhoid abdominalis may be developed to so slight a degree that only a bacteriological examination will be able to throw light upon the etiology of the disease. Children and elderly people frequently develop such typical symptoms, and among children, at least, typhoid usually runs a mild course. Thus it is explained, as Frosch and Brückner have shown, that children form a large percentage of the typhoid cases, and have a very essential part in the spreading of the disease. For example, Frosch found in the epidemic above mentioned that among the 73 typhoid cases no less than 52 were children. Furthermore, there has been no confirmation of the notion that neither children in the first year of life nor the senile contract typhoid. I have, in fact, frequently confirmed typhoid in children between 4 and 6 months old, as well as in old men between 60 and 80 years. Just as little can I verify the idea formerly held valid that women in childbed do not contract typhoid. Similar observations to those here described have been made in all the stations for typhoid research.

Valuable observations have likewise been made in the typhoid research stations regarding the clinical symptomatology of paratyphoid. Lack of time, however, prevents me going more deeply into this subject. An extremely surprising observation is this, that side by side with typical cases and mildly sick cases are found individuals who for weeks running eliminate typhoid bacilli with their excrements without, however, having at any time a single classical symptom of typhoid, not even a mild discomfort to point to the condition. In such individuals there follows a reaction of the body tissues against the invading typhoid bacilli; we must from a general pathological standpoint, likewise regard these healthy carriers of bacilli as typhoid cases, even though they be typhoid cases without clinical symptoms.

Epidemiologically, however, of greater importance is the further fact that the elimination of typhoid bacilli may not cease with the beginning of convalescence, but may persist during the convalescence for weeks, even for months; in fact that, as I myself have shown, in a certain percentage of cases even after complete recovery, the elimination of bacilli may persist for years, presumably till the end of life. According to one of my estimations, based on the large amount of material of the research stations in Idar and Saarbrücken, of all persons who have had typhoid, about 4 per cent. remain chronic carriers of bacilli. According to Brückner, whose data are based upon observations made in Strassburg, as well as those of Frosch, Schneider, and Park, the proportion may rise even as high as 5.1 per cent. The chief sites for the multiplication of typhoid bacilli in the carriers are, according to many investigations in which Forster and Josef Koch are pre-eminently concerned, the gall bladder and the larger bile passages. Klinger reported that in three cases of carriers of bacilli who came to autopsy, typhoid bacilli were found in large numbers in the bile. According to the investigations of Josef Koch, small colonies of typhoid bacilli are frequently found under the mucous membrane of the bile ducts. These make their way into the bile ducts. This location of the bacilli outside the general circulation and in the widely ramifying bile ducts explains why, up to the present, all attempts to free the bacilli carriers from the organisms—whether through internal medication, through active or passive immunization, or through cholecystectomy, as first recommended and carried out by Dehler—have completely miscarried.

About 75 per cent. of all typhoid carriers are adult women. Children only exceptionally remain typhoid carriers. This circumstance that women, often with large families, remain bacilli carriers, simplifies very materially

the problem of combating the danger of their becoming wide spreaders of the disease. It is sufficient, usually, to point out the possibility of infecting the family in order to make such women pay attention to the necessary cleanliness, especially of their hands, after defaecation, and of the careful handling of their soiled linen; and if this is done a great deal has already been accomplished, so that the employment of more stringent measures, which, on account of the duration of the condition, could not be persistently carried out, can be dispensed with. Naturally, bacilli carriers must, however, under all circumstances, be excluded from matters pertaining to food and the dairy.

That, indeed, the typhoid bacilli eliminated by the chronic carriers are able to produce new infections has been abundantly proved by the comprehensive and unequivocal material of the typhoid research stations as well as by repeated confirmation from other sides.

In fact, it has not rarely been observed in a place that just the first cases of sickness, coming after a longer or shorter interval, were caused by bacilli carriers, and that the infection still more widely spread by these sick persons. That, however, the infections caused by the bacilli carriers are not so frequent as one would at first sight suppose, finds its explanation in the fact that very soon all persons in the immediate neighbourhood of the bacilli carriers become infected, and go through typhoid fever in severer, or, especially as far as children are concerned, milder, form. There arises, therefore, about the carriers a regional immunity which to a certain extent acts as a protective wall for the more distant neighbourhood. Thus it is also explained that in the dwellings of such carriers, the so-called typhoid houses, it is seldom that a member of the family, but with great regularity outsiders —that is, visitors, new domestic servants—who fall sick of typhoid.

The transmission of bacilli from the sick or the bacilli carriers to the healthy results in the vast majority of cases from contact, whether it be from direct contact with unclean hands, or indirect contact, that is, the disease germ falling first upon objects—linen, the ground—and thence being transmitted to the healthy. In this manner long contact chains may arise.

Infected drain water, water courses, and wells, from lack of precaution in the handling of milk or other foods, are sources of infection that may lead to the sudden appearance of typhoid in a large number of people. Such explosive-like epidemics arising from a common cause tend to excite the general attention which only exceptionally is started by the endemic form in the course of long contact chains.

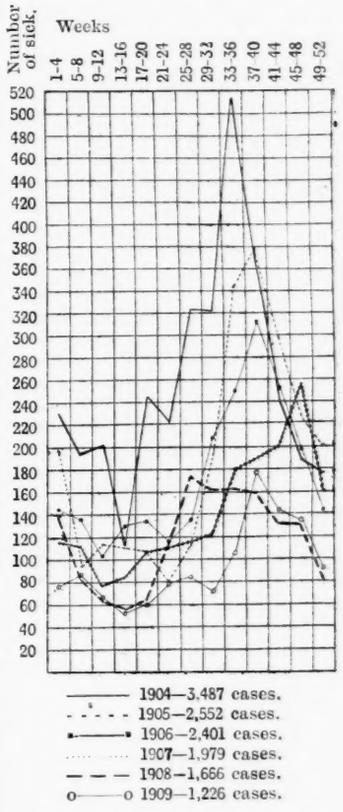
Through the natural fluctuations of the population, through immigration and wandering labourers, typhoid is borne into other uncontaminated districts, a factor which is of importance in typhoid epidemiologically.

I must content myself with these few remarks about the epidemiology of typhoid. Anyone who pays attention to the customs of the people, especially of the country people and the behaviour of the children at play, or who glances at their commonly defective living conditions, arrangements for water supply and the disposal of excrements, will recognize without difficulty the manifold ways in which typhoid bacilli can be transferred from the diseased to the healthy and will discover the unhygienic conditions which favour the outbreak of typhoid infection.

Surely no infectious disease of man is so adapted as typhoid to shed light upon all the hygienic conditions under which we live or to disclose their defects. How much the typhoid campaign improved hygienic conditions is shown in the communication of Schneider, which states that in the Prussian Governmental district of Frier alone between the years 1904 and 1907, 186 new water systems had been installed, 4 localities entirely drained, and 59 localities in part, and that 51,000 refuse places, 58,000 closets, and 345 000 metres of street gutter had been constructed. During the same period in the Bavarian Pfalz, 122 water systems and 18 drainages have been newly built or widened, and in Alsace-Lorraine in 233 parishes more or less extensive improvements of the drinking-water supply have been carried into effect. That this comprehensive betterment of the hygienic conditions has proved itself of great value not only with regard to typhoid but to all infectious diseases, goes without further discussion.

Finally, a few statistical data concerning the typhoid morbidity will show how considerable a reduction of typhoid in the campaign districts is owing to the co-operation of the different factors of the systematic campaign.* First of all I should like to refer to the accompanying chart, in which the positive typhoid cases occurring between 1904 and 1909 in the whole campaign district are arranged together in the form of curves. A single glance at the chart shows that the absolute number of typhoid cases has diminished materially from year to year. Above all, however, the apices of the curves representing the late summer and autumn are lower from year to year. This latter circumstance is due to the fact that in the earlier years there were still many fairly large epidemics arising from common sources which often caused the typhoid frequency to mount very quickly, while in the last two years only two such epidemics in all occurred. The prevention of such epidemics is a significant immediate result of the typhoid campaign.

Typhoid Fever Morbidity in the Whole Region of the Typhoid Campaign Work.



It has been further noted on the table that the typhoid morbitity in 1904 amounted to 3,487 in 1905 to 2,552, in 1906 to 2,401, in 1907 to 1,979, in 1908 to 1,666, and in 1909 only to 1,226 cases. In 1909, therefore, the number was only one-third of that of 1904. Among each 10,000 inhabitants in the entire campaign district, 10 9 in 1904, 8 in 1905, 7.5 in 1906, 6.2 in 1907, 5 2 in 1908, and 3.9 in 1909, contracted typhoid. (In the whole of Prussia during the same period the percentage computed as above diminished only from 4.3 to 3.4 per 10,000) Also the number of places which were attacked by typhoid in the campaign district shows an unmistakable reduction. For example, in 1904 18.4 per cent. of all places (villages and towns) were attacked, in 1905 16 per cent., in 1906 15.5 per cent., in 1907 14 5 per cent., in 1908 14 per cent., and in 1909 only 9.8 per cent.

These data speak an eloquent language: they show unequivocally that the systematic campaign planned by Robert Koch in the face of many difficulties—such as the bacilli carriers, who were first recognized during the campaign—has succeeded in reducing typhoid very materially. These evident results bring with them the hope that in no far distant time the civilized world may be freed from this scourge of mankind.

III.—Drs. F. A. Bainbridge and R. A. O'Brien.

THE DISTRIBUTION OF CERTAIN BACILLI OF THE FOOD-POISONING GROUP.

The distribution of *B. suipestifer* and *B. paratyphoid* B and their relation to disease in man have during the last few years attracted much attention and given rise to considerable differences of opinion. We propose first to summarize the current views on the subject and then to refer

* These statistical data for the years 1904-8 I have taken from Fornet, Beiträge zur Physiologie der Typhusverbreitung, *Ztschr. f. Hyg. u. Inf.*, Bd. 64, p. 364, ff. The data for 1909 I owe to the kindness of the Imperial Commissary Ober-Regierungsrat, Dr. Schreiber, at Saarbrücken.

briefly to our own observations as to the occurrence of these organisms.

Current Views.—The two main points at issue at the present time are (*a*) the relation of these two bacilli to each other, and (*b*) their occurrence in diseased and healthy men. *B. paratyphoid* B was originally isolated from patients whose symptoms were those of typhoid fever, and was at first regarded as distinct from the *B. suipestifer* (or *aertryck*), which has been found in many outbreaks of acute food-poisoning in man, and is a secondary invader of the blood and organs in swine fever. This view is still held by many writers, and it has been shown by Boycott and by Bainbridge that these two organisms can readily be distinguished from one another by means of the absorption method, if this method is properly used. Others, however, who have confined themselves to cultural and agglutination tests, regard *B. aertryck* and *B. paratyphoid* (B) as identical, and indiscriminately describe as *B. paratyphoid* B the organisms obtained from cases of paratyphoid fever or food-poisoning or from food. Further, Conradi, Rommeler, Mühlens, Dahin and Fürst, and other writers have brought forward evidence that paratyphoid bacilli are widely distributed not only in food but also in the faeces and urine of typhoid convalescents and carriers and of healthy men.

Unfortunately these workers did not attempt to ascertain whether the bacilli which they obtained were *B. paratyphoid* B or *B. suipestifer*, an omission which robs their work of much of its value. Nor do their results correspond with those obtained by Morgan and by Savage in their examination of human faeces and urine.

Our Observations.—In the hope of throwing further light on these points we have followed out two lines of inquiry.

In the first place we have had the opportunity, through the kindness of Dr. Ledingham, of examining the plates made from the faeces and urine of about 270 typhoid convalescents, who were in normal health. Colonies which did not ferment lactose were picked off the plates, and subjected to the cultural tests necessary for their identification. In all, 290 colonies were examined and though many of them showed a superficial resemblance to *B. paratyphoid* B or *aertryck*, not one corresponded exactly in its cultural reactions to those bacilli. Several of the cultures were tested against a paratyphoid or *aertryck* serum, and their agglutination reactions were completely negative in all cases.

Secondly, we obtained from various sources twenty strains of bacilli which (with one exception) were stated to be paratyphoid bacilli. They had been isolated from food, from cases of food-poisoning, from cases of paratyphoid fever or carriers with the bacilli constantly present, or from healthy men. These strains were tested as to their agglutination and cultural reactions, and also by the absorption method.

Two were excluded—one on cultural grounds, one because it failed to agglutinate with paratyphoid or *suipestifer* serums. The remaining eighteen strains were indistinguishable from *B. suipestifer* or *B. paratyphoid* B in their cultural and their agglutination reactions. By means of absorption tests, however, they were separated into two groups—namely, a group which behaved in all respects like a strain of *B. suipestifer* obtained from a healthy pig and like the original *aertryck* strain of v. Ermengen, and a second group which was indistinguishable from the original Schottmüller strain of *B. paratyphoid* B. The first group consisted of four strains—one from a case of food poisoning, and three from food. The second group consisted of fourteen strains—namely, six from cases of paratyphoid fever, four from paratyphoid carriers, and three from healthy men. (We have not been able to ascertain whether the "healthy" men were intermittent carriers or had recently suffered from paratyphoid fever.) The origin of the fourteenth strain is still uncertain. It was recently isolated (during a small epidemic) from patients whose clinical symptoms were those of acute food poisoning. It was impossible, however, to correlate the outbreak with unsound or infected food, and there are reasons for supposing that a paratyphoid carrier may have been responsible for the outbreak.

Conclusions.

We feel that these observations are too limited to justify the expression of dogmatic opinions upon the distribution of these organisms, more especially as much of the material with which we worked was not obtained at first-hand, and the history of some of the strains of the bacilli is not as complete as we could wish. But, so far as our evidence goes, we are disposed to take up the following position.

In the first place, we consider that *B. suipestifer* and *B. paratyphoid* B are separate organisms; we regard the distinction which is brought out by the absorption method or by agglutination test as indicating a real difference, which is not merely of academic interest, but of definite epidemiological value.

Secondly, it is significant that these strains, which are identical with *B. suipestifer*, have been found by us to be those derived from food only or from disease directly associated with food. It is not surprising, as many workers have shown, that this bacillus should be widely distributed in meat, especially meat derived from the pig, for the *B. suipestifer* is a frequent inhabitant of the intestine of this animal. It is also to be expected that this bacillus, if present in meat, will from time to time be ingested by man, though its stay in the human alimentary canal appears to be very transitory, since it was not found once in the 270 cases which we examined. And Conradi has shown that when meat containing bacilli indistinguishable from *B. suipestifer* is eaten, the bacilli can be isolated on the following day, but not subsequently.

Thirdly, all our strains of *B. paratyphoid* B were obtained from man, and the fact that four of them were obtained from chronic carriers seems to us to have a very important bearing on the epidemiology of paratyphoid fever, which is still very obscure. Although we have not obtained *B. paratyphoid* B from food, the existence of carrier cases introduces the possibility that they may occasionally infect food (as a typhoid carrier cook might do). But our observations rather suggest that, as a rule, *B. paratyphoid* B has its habitat, not in food, but in the human body.

Finally, our failure to find *B. suipestifer* or *B. paratyphoid* B in a large number of cases of typhoid convalescents agrees with the observations of Morgan and of Savage, and is opposed to the results obtained by Conradi, who found 10 per cent. of paratyphoid carriers in such cases. We can only suppose that, fortunately for us, the distribution of these organisms is much more limited in England than it is abroad.

DISCUSSION.

Professor E. J. McWeeney (Dublin) said that he had listened with much interest to Dr. Houston's and Professor Lentz's remarks, more especially with regard to "carrier" cases of typhoid. He had at present under observation a girl whose urine regularly contained typhoid bacilli in pure cultivation in numbers varying from a few score to several thousand per cubic centimetre. The faeces never contained the bacillus. The girl had had typhoid seven years ago, and since then had given rise to many cases of typhoid in families where she had acted as cook, and amongst persons who consumed the milk from a dairy in which she was employed. He detailed the various means he had employed, including urinary antiseptics, such as hetraline, urotropin, and borovertin, and vaccine treatment with her own "strain" of bacillus, but hitherto without success. By means of the cystoscope and catheterizing the ureters this girl had been shown to have a typhoidal pyelo-nephritis, and that the local condition was influenced by the vaccine injections was shown by the critical discharge of bacilli that took place on the day after each injection. No doubt the semi-necrotic tissue of the renal pelvis exfoliated to some extent, but the fact remained that the patient was not cured. She was still excreting the bacilli in thousands or millions per diem, and was thus rendered incapable, though apparently in good health, of earning her livelihood in the only capacity for which she was fitted. In his opinion the law did not give sanitary authorities adequate powers to deal with such cases. They should be kept under constant supervision, and, if necessary, assisted to live, as they could not be allowed to earn their livelihood. He asked Professor Lentz whether the investigations into the dissemination of typhoid in South-West Germany had been instrumental in bringing about a change in the public health law of that country with regard to typhoid carriers. He would also ask Professor Lentz whether, in his experience, the proportion of females to males amongst urinary typhoid carriers was as great (3 to 1) as amongst those who harbour the bacilius in the gall bladder and intestine. He concluded by referring to the nutrient media used for detecting the typhoid bacillus in excretal matter, and stated that in his experience "China-green-agar," as recommended by Werbitzki, exercised a more decided inhibitory effect upon *coli* than even malachite green. He asked Professor Lentz whether he had tried this medium, and, if so, with what result.

Dr. R. M. BUCHANAN (Glasgow) stated that his experience of carriers of infection was limited to typhoid fever, diphtheria, and cerebro-spinal fever. At the moment he could vividly recall five typhoid carriers, three of whom were elderly women and two youngish men. The bacillus was found in the faeces only of the women and in the urine only of the men. The first of these carriers to come under observation was a woman with an indefinite febrile illness and great distension of the gall bladder. The blood gave a positive Widal reaction and the clear fluid obtained on puncturing the gall bladder yielded a very profuse growth of *Bacillus typhosus*. It required daily irrigation of the gall bladder with 1 to 40 solution of carbolic acid for about five weeks to rid the bile of the bacillus. The patient had had twenty years previously a feverish illness of three weeks' duration, which was most probably typhoid fever but called at the time "gastric fever." The second woman, a milker, gave rise to a severe epidemic of typhoid fever in the distribution of the milk supply. She had suffered from typhoid fever sixteen years previously. The third woman had just been a few months out of hospital and gave rise to a small epidemic amongst her visitors and immediate neighbours. The two men illustrated the difficulty already alluded to by Professor McWeeney of stopping the discharge of the *Bacillus typhosus* by the urine. In one man with haemorrhagic pyelitis drugs had no apparent effect, and the bacilli disappeared with the abatement of symptoms in four months. Two of the patient's attendants were infected very early in the course of the illness, and both passed through a typical attack of typhoid fever. The other man gave rise to a return case from his own household. Beyond this he has left no trail of cases, although he has continued for over a year to shed bacilli in great number uninfluenced by drug or vaccine treatment. This carrier fully realizes the danger of infecting others, and takes the fullest precautions which a man in his station of life (a labourer) can observe. The continuous isolation of such a man would be a severe hardship unless the State made provision for the maintenance of his family. The examination of a large number of diphtheria contacts had revealed the fact that 8 to 10 per cent. were carriers of the infective agent, and that these people retained the bacillus in their throats on an average just about the same length of time as patients. If hospital isolation of such positive contacts were adopted, it would require in many instances to be just as prolonged as that of patients. In the case of cerebro-spinal fever he had found during the epidemic in Glasgow that amongst the members of the invaded households as many as 26 per cent. were carriers of the infection, the meningococcus being readily demonstrable by culture in the secretion of the naso-pharynx. It was a remarkable fact, however, that the infectivity of these carriers was very low, for no case of infection could definitely be traced to one of them after their discovery.

Dr. G. F. PETRIE (London) summarized recent researches into the mode of transmission of the plague bacillus. From the point of view of the discussion introduced by Dr. Houston, the life-history of this bacillus was of considerable interest inasmuch as it was perhaps more chequered than that of any other bacterium associated with an epidemic disease. Plague was apparently the only bacterial disease transmitted to man through the medium of an insect, and it seemed also to be unique in that it was primarily a disease affecting a lower species of animal (the rat); it became a human disease incidentally from the occasional close association of rats with man. The sequence of events in a plague epidemic might be thus stated: First, there was a seasonal increase in the numbers of fleas infesting rats, due most probably to climatic conditions favourable to the breeding of these insects. Next came the rat epizootic, also showing a definite seasonal prevalence. The human cases increased and diminished *pari passu* with the epizootic, the interval between the rat plague and human plague curves representing a mean period of about twelve days. Recent researches in India had shown that every outbreak of bubonic plague when adequately investigated was associated with the disease amongst rats, so that it must be concluded that this correlation was invariable and universal. The available evidence pointed strongly to the disease being spread amongst rats by the rat flea. The rat flea might be said to combine the functions of a culture tube and of an inoculating needle with respect to the spread of the epizootic, the blood imbibed by the flea forming a culture medium for the multiplication of the plague bacilli.

In a plague epidemic there were three conceivable infective agents: (1) The infected rat, (2) the infected rat flea, and (3) the infected human being. The influences which might affect the bacillus in each of these media were both numerous and varied. (1) The question of the relation of immunity to plague in rats and the virulence of the plague bacillus may be raised. As tested in Bombay the virulence of the bacillus derived from rats did not seem to vary much throughout the year. A septicaemia would not probably occur in a partially immune rat, so that the chances of transmission of the bacillus by fleas from such a rat would be small. Hereditary transmission of immunity in rats might conceivably affect the epizootic and perhaps help to bring it to an end, but judging from experimental data on the inheritance of immunity in other infections it was unlikely that this factor influenced materially the continuance of acute plague in a rat population. (2) Plague bacilli in the rat flea were subject to external influences—for example, temperature. The rate of multiplication of the bacilli in the flea was liable to be affected by the temperature of the surrounding air. The Plague Research Commission had found that the duration of infectivity of the rat flea depended largely upon the kind of blood on which the flea fed. If infected fleas were fed on rats immune to plague the infectivity of such fleas was much diminished. The explanation seemed to be that the immune opsonins in the imbibed blood favoured the phagocytosis of the plague bacillus in the flea's stomach. This phagocytic influence was further markedly affected by variations in the temperature of the surrounding air. (3) Plague bacilli were excreted in the urine of septicaemic human cases, but these bacilli did not seem to be effective in spreading the disease. Pneumonic plague was extremely contagious by direct infection of the respiratory tract. Chronic carriers in the sense of typhoid and diphtheria carriers did not probably play any part in the spread or recrudescence of the disease. The phases through which the plague bacillus was liable to pass might be shown schematically as follows:

1. Septicaemic rat —→ infected rat flea —→ septicaemic rat —→ infected flea = epizootic.
2. Septicaemic rat —→ infected rat flea —→ immune rat.
3. Septicaemic rat —→ infected rat flea —→ ? partially immune rat —→ chronic rat plague.
4. Septicaemic rat —→ infected rat flea —→ human case = epidemic bubonic plague.
5. Septicaemic rat —→ infected rat flea —→ human septicaemic case with severe secondary pneumonia —→ pneumonic plague.
6. (Excreta of acute rat and human plague not infective.)

The table might be interpreted as follows:

1. The epizootic is maintained through a series of susceptible rats by the agency of the rat flea.
2. If an infected rat flea conveys the bacilli to a rat immune to plague, these bacilli are disposed of in the tissues of the rat.
3. The pathogenesis of the condition commonly known as chronic rat plague is obscure. It may be that it is ascribable to an infection in a rat with partial immunity to plague. The Plague Commissioners have pronounced against the view that the bacilli in chronic plague lesions are likely to spread the infection amongst rats. It is probable that the bacilli in these lesions sooner or later cease to exist.
4. The available evidence is strongly against the spread of infection from a case of human plague to the contacts.
5. It is conceivable, however, that a human septicaemic case with an extensive secondary pneumonia may originate a case of primary pneumonic plague, and this may infect contacts with the same type of the disease, that is, the pneumonic type.
6. The *Bacillus pestis* has probably no saprophytic phase of importance from an epidemiological standpoint.

To sum up the whole question of the transmission of plague, it might be said that the rat with acute septicaemic plague would seem to be the ultimate reservoir of the plague bacillus.

Dr. SAVAGE (Weston-super-Mare) brought forward certain facts derived from his investigations of the bacteriology of garget in cows, which suggested the possibility of the existence of bovine streptococcus carriers. About 75 per cent. of the cases of mastitis or garget in cows were due to streptococci, and the great majority were due to a special long-chain form which he called the *Streptococcus mastitidis*. The connexion between certain outbreaks of human sore throat and local udder disease of the cow was epidemiologically a strong one. One of the commonest

causes of human sore throat was the streptococcus called by Andrewes and Horder *Streptococcus anginosus*. It was of great interest to compare these two types of streptococci. Morphologically and culturally they were indistinguishable even when the series of sugar-alcohol tests introduced by Gordon were employed. Their only difference was in their pathogenic properties. The *Streptococcus mastitidis* was of low virulence for the small laboratory animals. Occasionally a local abscess was produced, but usually it had no observable action upon mice or guinea-pigs. The *Streptococcus anginosus*, on the other hand, was usually pathogenic for these animals. The *Streptococcus mastitidis* readily set up mastitis in goats; the *Streptococcus anginosus* had no such action. The latter was a cause of human sore throat, while the former, even when inoculated in very massive doses upon the human throat, was quite without effect. The two types showed pronounced differences as regards their powers to cause disease in rodents, goats, and human beings, although otherwise identical.

He had followed up the question further, and studied the persistence of these organisms in a bovine and human habitat. The human streptococci, for the most part, when inoculated upon the interior of goat's teats, failed to establish themselves, and, with one striking exception, rapidly died out. The bovine streptococci lived for much longer periods in the udder of goats, but very rapidly died out when inoculated upon a healthy human throat. Although in his experiments the human throat infection was extremely massive in character, the inoculating bovine streptococci could only be recovered with great difficulty, although the isolation was undertaken only two and three days respectively after the inoculation; also when they were recovered their power to produce mastitis in goats was already somewhat diminished. One striking exception was, however, met with. In the case in which the streptococcus isolated from the spleen of a boy who died of acute lymphadenitis was used to infect a goat's teat, it did not set up mastitis, but survived as a harmless (to the goat) saprophyte for the whole duration of the experiment, extending over seven months. During this period it had not caused any inflammatory changes or alteration in the appearance of the milk, nor had its biological character become altered, except in one particular, and that inconstantly.

Another fact which must be considered was that all streptococci causing mastitis were not of the *Streptococcus mastitidis* type, and that undoubtedly some mastitis conditions could set up human disease.

These facts had a definite practical lesson, and bore directly upon the subject under discussion. It would be of great interest to know if the lymphadenitis streptococcus after its sojourn in a bovine habitat was still pathogenic to man. It had originally caused a secondary infection in a boy with marked elevation of temperature, and no doubt largely contributed to his death. Most likely at the end of the experiment it was non-virulent, but probably for some considerable time while it was being excreted into the milk in large numbers, and this without visible alteration of the milk, it would still be pathogenic to man. In the same way the sore-throat streptococci tended rapidly to disappear from the goat's udder, but the disappearance was only relative, and they did persist for as long as twenty-six days in one case without any alteration of the milk. He was rather driven to the provisional conclusion that the streptococci of purely bovine origin were of modified, possibly quite negligible, influence as a cause of human disease, and that more danger was to be feared from streptococci of human origin, which, while not setting up disease in the cow, yet could be transmitted by the cow. In other words, he feared the cow as a passive transmitter of disease. He could imagine, under the prevailing filthy conditions, a milker with sore throat easily infecting the teats of one or more of his cows with the streptococci from his own sore throat, and the streptococci multiplying and appearing in huge numbers in the milk for a little while, and so spreading an extensive epidemic. The cow might serve as a streptococcus carrier, and disease be lit up from time to time by unknown pathological causes. Unlike the human typhoid carrier, he believed the virulence would disappear in time, although the organisms might persist, but he might be wrong in his hypothesis, and virulence might persist all the while. He need only remind the meeting of Todd and Dean's outbreak of diphtheria spread by milk, in which the udders were extensively ulcerated and infected with diphtheria bacilli. The cows were acting as carriers of diphtheria bacilli, probably in a purely passive rôle. He was in agreement with Dr. Houston that the "producers" of disease must be rendered inoperative. Dr. Houston's paper was essentially a comparison between the value of general and individual precautions. Obviously, both were necessary, but he was quite in agreement with him that no general precautions were sufficient to eliminate the necessity of tracing out and dealing with infectious individuals.

Dr. HOUSTON, in reply, said that the consensus of opinion appeared to be strongly in favour of the desirability of attaching increased importance to the living factories of disease and decreased importance to the passive transmitters of disease. One great difficulty presented itself in connexion with the question of carriers, namely, how far the bacilli concerned were really infective. It seemed fairly obvious that all the living carriers of disease germs could not exercise a continuous infective ability, otherwise few people could hope to escape infection for long. Until it was possible to distinguish between dangerous carriers and carriers possessing little or no infective power the hands of the administrator were almost tied. A wholesale legislative programme would present difficulties of a most serious kind. Professor McWeeney had called for compulsory powers of treatment, but, even if these were obtained, what was the outcome? In the absence of known rapid and effective curative measures, was it reasonable to ask the State to bear permanently the cost of supporting an army of ostracized disease carriers, many of which might be relatively harmless in an infectious sense? However this might be, all were agreed that nothing but good could arise from greatly extended work on the subject, and, as their knowledge increased, difficulties which now appeared insuperable might eventually disappear.

Dr. LENTZ, in reply, said: Professor McWeeney has asked me if in Germany any special legislative measures have been taken with a view to the control of typhoid carriers. That is not so. We received in 1905 a new general law for the control and treatment of infectious diseases in Prussia. In this law are included the general regulations and instructions for the conduct of the typhoid campaign, but against the carriers no special orders have been given. The medical officers of health are instructed, however, to see that the carriers pay attention to the cleanliness of their hands and linen. With regard to those who carry typhoid bacilli in the urine, I may say that women give a percentage of 60 per cent., while of the carriers who pass the bacilli in stools 75 per cent. to 80 per cent. are women. Of the China-green-agar of Werbitzki I have no personal experiences; Gacthgens, who instituted a comparative series of experiments with various media, praises the China-green-agar method of Lentz-Tietz. With regard to the fourth question of Professor McWeeney, I may say that of eleven carriers ten gave a positive Widal reaction. Among paratyphoid carriers the percentage of those giving no reaction was larger.

DYSENTERY CARRIERS.

By G. H. K. MACALISTER, M.D., D.P.H.,

EPIDEMICS of bacillary dysentery in this country are at the present time limited almost entirely to the precincts of lunatic asylums and such institutions, although sporadic cases, often unrecognized, occur also among the general population. The nature of these endemics is of a type only too well known to the officers in charge. Infection is everywhere, and most of the inmates become attacked sooner or later. There appears, however, to be a species of natural immunity which protects the robust—members of the staff, for example—but this may be overcome by a big dose of infection.

Epidemics may be due to the presence of either the Shiga or the Flexner bacillus. At times, moreover, the two types may occur side by side in one epidemic. Outbreaks due to infection with the Y bacillus occur in Germany, characterized by a relatively high proportion of

chronic cases. The particular epidemic that I have studied, with which I propose to deal presently, owes its origin and maintenance to the Flexner bacillus, but in a small proportion of cases, indistinguishable by clinical means from the majority, other organisms, such as *B. pyocyaneus*, Morgan's bacillus No. 1, *B. proteus vulgaris*, have been found alone—instances, perhaps, of secondary infections.

The nature of dysentery outbreaks is such as to suggest that the disease is propagated by contagion, direct or indirect, from person to person. They lack the explosive character of water or milk epidemics. The course of the outbreak bears a strong resemblance to that of other diseases in which carriers have been shown to constitute a prominent etiological factor. Particular incidents in the history of a number of dysentery epidemics supply evidence which indicates that here, too, carriers may be of great importance.

Carriers, in the widest sense, may be distributed into two great classes. The first class consists of healthy persons, who have never suffered from the disease, and show no signs of ill health, but nevertheless harbour and scatter the specific organism. Those, on the other hand, who make up the second clsss, are persons who have had the disease, and are thereafter unable completely to eliminate infection. Their after-history is chequered by minor disturbances of health, and by intermittent liberations of the specific bacterium.

Cases of the first type, in the instance of dysentery, are rare, and probably unimportant. Conradi recovered the bacillus from five healthy children, all of whom had, however, been living in the midst of infected adults. Two similar cases, also in children, are reported by Collins. Otto Mayer, while investigating an epidemic of pseudo-dysentery, found a relatively larger number of healthy carriers, but of these persons at least one developed the disease after isolation. I have not been able to find a single case of this type. As regards convalescent carriers, I am unwilling to dogmatize prematurely, but my experience appears to go far in confirming the view that, as agents in the spread of dysentery, the importance of this class cannot well be over-estimated.

During the past half year I have had the opportunity of studying an epidemic occurring at a large lunatic asylum in the Midlands, and I am glad to have this opportunity of expressing my thanks to the medical superintendent for placing the material at my disposal. As the disease has been prevalent for a number of years, it has been possible to obtain specimens from patients at all periods—some during or shortly after attack, others after widely varying periods of freedom from disease. A rise in the number of cases took place during April, and in consequence it has been possible to make a particular study of these persons during early convalescence.

From 120 inmates I have received about 200 specimens of faeces to examine bacteriologically. Concurrently, agglutination tests were performed upon a rather smaller number of serums from the same persons. After a short account of the results of this work I propose to attempt a classification of cases and an estimation of the number of potential carriers.

The methods pursued have been of a simple and stereotyped nature. In dealing with faeces, a loopful was plated upon MacConkey's lactose neutral-red bile-salt agar. From these plates, after incubation, suspected colourless colonies were picked off into mannite peptone water. Cultivations that showed an acid reaction in this medium were tested for a further series of sugar-fermentation reactions. Complete identity was established by testing the degree of agglutinability of organisms with a Flexner-rabbit serum of high potency.

In order to select a suitable portion of a sample for plating it was necessary in some cases to spread the material in a sterile dish. Mucus was taken if possible, as this is the most usual habitat of the bacillus. Second or third platings were performed before a negative result was recorded, but even so, negative results are far less certain than positive. A minute portion only of a small sample of a single stool is examined, and thus much territory must be left unexplored.

Twenty-eight specimens from acute cases gave 13 positive results. Among the remaining 15 negative samples there were 7 from which some other pathogenic form was isolated, which may have masked or replaced the primary infection. *B. pyocyaneus*, for example, was obtained three times. As a rule, the Flexner bacillus was isolated readily from typical acute dysenteric stools containing mucus and blood. With disappearance of blood and diminution of mucus the proportion of positive findings diminished greatly. Almost invariably the bacillus could no longer be recovered from stools after complete return to the normal faecal type. The table below shows the condition of affairs in the April and May cases where it has been possible to make repeated observations during early convalescence.

	First Week.	Second Week.	Third Week.	Fourth Week.	Second Month.	Third Month.
Percentage of samples from which Flexner's bacillus was recovered	67	33	25	16	20	0
Percentage of cases suffering from definite clinical attack	100	23	8	4	1	0

These figures show that clinical convalescence is in advance of that determined by bacteriological examination.

The difficulty of proving a complete negative by these bacteriological methods gives an added importance to agglutination results.

The strain of Flexner bacillus used for this purpose was one isolated from the earliest positive case examined. The dilutions of serum investigated ranged from 1 in 25 to 1 in 400. Microscopic methods were employed throughout. Complete clumping in dilution of 1 in 100 was regarded as positive, but lower dilutions were in general disregarded.

Twenty-five serums from acute cases gave seventeen positive results. Four of the remaining eight negative samples were obtained at the very commencement of the attack—that is to say, before the development of specific agglutinins.

Examination of serums obtained from persons during quiescent seasons showed that, unlike typhoid, there is no definite time limit for the disappearance of specific agglutinins after termination of an attack.

	Positive Agglutinations.	Negative Agglutinations.
During attack	17	8
After 6 months	5	6
6 months to 1 year	7	6
1 to 3 years	12	12
3 to 5 years...	4	5
5 to 8 years	1	4

This table shows that while in many cases agglutination no longer occurs a few months after an attack, there is a very large number in which, even after a lapse of years, the serum retains the power of clumping in high dilutions.

Unsupported by other evidence, persistence of agglutination must not be thought invariably to connote persistence of infection. The problem is more complex than this. On the other hand, in the presence of such residual agglutinations, it is difficult to prove that these cases no longer contain an infective focus. Moreover, when the history of such persons is chequered by periodic disturbances of health, amounting often to definite relapses, the presumptive evidence in favour of the existence of such a focus becomes very strong. This gives such an importance to residual cases that it becomes necessary, before proceeding to classification, to consider them in detail.

A review of the clinical features of the whole series shows that persons who recover completely from acute dysentery possess considerable powers of resistance to further infections. In the rare cases where such persons yield to a fresh infection from without, the second attack is acute and pursues a similar course to the primary attack.

In relapsing cases, in which it is supposed that further infections come from within, the history is different. That convalescence from the primary acute illness is incomplete is shown first, by the persistence of a high agglutination figure; and secondly, by the continued presence in the faeces of mucus, albeit in greatly varying degree. Further attacks are subacute, and may possibly last for no longer than a single day, but sometimes they may be intractable and continue for relatively long periods. Attacks may be determined by circumstances which lower the general resistance. Cold, bad weather, and particularly unsound food, are the most obvious exciting factors. The series contains records of twenty-four occasions upon which unsuitable diet provoked a relapse. In rare cases returns of the disease become frequent and protracted, and the

illness assumes a chronic form. But this is rare in the case of Flexner dysentery.

It is not yet possible to dogmatize as to the site of such persistent infective foci, but in analogous cases of infection with the Y bacillus—where, however, the disease is of a more chronic type—rectal ulcers have been seen with the rectoscope. If the focus be in the intestinal wall, it is probable that bacilli are in fact constantly being passed out. During quiescence, when the motions are well formed and the amount of bacteria very small, the danger of infecting others is negligible, even apart from any possibility of diminution in virulence or toxicity—a point not yet worked out. But at times, apart from recognized attacks, there may occur minor disturbances—manifested, it may be, by a single stool rich in mucus—which may escape the notice of both patient and attendant, and consequently become a fertile source of infection. The system of classification depends upon the completeness of convalescence after the primary attack. Recent cases which have not been under observation for a sufficiently long period are not included in the following table:

	Male.	Female.	Total.	Percentages.
1. Complete recovery	20	23	43	53 7
2. Single attack, but agglutination remains high; stools usually contain a trace of mucus	9	7	16	20
3. Relapsing cases	4	15	19 \ 21	26.2
4. Chronic cases	—	2	2 /	

The first group contains persons who after the primary attack return to normal health and are for a season immune against fresh invasions. Members of asylum staffs and the more robust inmates come under this heading.

The second group is made up of those cases whose complete recovery is only discounted by the continuance of agglutination, and by the presence of small quantities of mucus in the faeces. They do not relapse. Possibly they harbour infection somewhere, but further evidence is required to secure conviction. Administration of a simple purgative might perhaps determine the elimination of bacteria.

Types of Cases.

GROUP II.—G. R., male, aged 55. Attack April 11th, 1905, lasting three days. Result of examination January 25th, 1910: Faeces negative; agglutination positive ($\frac{1}{100}$).

GROUP III.—F. H., female, aged 24. Five attacks between June 29th, 1906, and January 9th, 1910. Result of examination February 3rd, 1910: Faeces positive; agglutination positive.

GROUP III.—J. A. S., female, aged 37. Four attacks between September 16th, 1903, and April 2nd, 1909; two attacks provoked by food. Result of examination February 1st, 1910: Faeces negative; agglutination positive ($\frac{1}{100}$).

The third group contains relapsing and chronic cases, whose nature has already been described. To define the position of these three groups with regard to the question of potential carriage, the language of Scots law may be borrowed and verdicts of "not guilty," "not proven," and "guilty" be returned. The figures in the table show that, if this view be accepted, 26 per cent. of these cases must be regarded as possible transmitters of contagion. These considerations emphasize above all things the great need for care during and immediately after the primary attack. The first step towards the prevention of an epidemic must be one that obviates the development of a class of incomplete convalescents. To this end no method of treatment, local or general, should be omitted. During early convalescence the same care should be taken as during the attack. The consistence of the stools should be watched, and Widal's tests be performed from time to time. Until the results of these observations be satisfactory, these persons must not be allowed to mingle with their healthy fellows. Persons that have already come under the heading of incomplete convalescence must be strictly isolated, while means should be taken to discover, if possible, and eliminate the focus of infection. Members of the second group should be domiciled in a separate block, if possible, and it is superfluous to add that no laundry or kitchen work should be assigned to any such suspected persons.

The conclusions, put very briefly, are:

1. That healthy carriers are very rare, and of no importance.

2. That the actual carriers are to be found among the incomplete convalescents, which form a high proportion of the cases.

3. That in combating an epidemic it is necessary to reduce as far as possible the number of such cases, and to isolate very strictly those that are already of this type.

DIPHTHERIA CARRIERS.

By JOSEPH A. ARKWRIGHT, M.D.Cantab,
Lister Institute, London.

BEFORE the specific bacillus was discovered it was recognized clinically that persons who had not themselves suffered from recognizable diphtheria, but who had recently recovered from a sore throat, were liable to give diphtheria to others. The occurrence of the *Bacillus diphtheriae* in the fauces of patients three to fourteen days after the disappearance of the membrane was described by Roux and Yersin in 1888; and Loeffler reported in 1890 a case in which bacilli able to cause the disease, were found in the fauces of a patient three weeks after apparent recovery. Since that time numerous observers have recorded the persistence of the bacillus and its continued virulence for long periods after all local naked-eye symptoms of the disease have passed away. In fact, this phenomenon has become one of the best known facts of bacteriology, which are of practical everyday interest, and at the same time one of the chief bugbears of general practitioners and medical officers of health. Moreover, it is not only during convalescence from diphtheria, and after slight attacks of sore throat, that the bacillus may be present, but also after contact or association with diphtheria patients, both adults and children are liable to harbour the bacillus in their fauces, even when no local or constitutional disorder of any kind has been noticed.

There are thus two classes of healthy carriers of the diphtheria bacillus. First, "convalescents" who have had the disease and have retained the bacillus after apparent return to health; and secondly, "contacts," who have never had the disease at all as far as can be discovered, but who have at some time been in contact with a case of diphtheria or another "contact." To these two groups must be added a third group of carriers, consisting of those persons who are suffering from the disease in a chronic form without constitutional symptoms. These latter are very important as regards the spread of the disease. In some cases the chronic form appears to have existed in a patient for years, though it cannot be stated that no intermission has occurred during that time. For instance, one may cite the case of a nursemaid recorded by E. Neisser, who thought it probable that she had had the disease on and off for fourteen years. Cases of membranous or fibrinous rhinitis due to the diphtheria bacillus are best included in this group; some of these cases last for at least two or three years.

The large majority of healthy carriers of both the convalescent and contact classes soon lose the bacilli. Probably about half the convalescents are free by the time that the local exudation on the fauces has disappeared. Welch, Prip, and Glucksam quote large numbers of cases which support this statement.

Welch examined 752 cases, and of these 427 only retained the bacillus after the disappearance of the membrane. One week after disappearance of membrane 47 per cent. of the 427 were still infected; one month after, 2.5 per cent. were still infected.

Prip examined 654 patients in hospital, of whom 345 retained the bacillus after disappearance of membrane: 38 per cent. for ten days from this date; 16.5 per cent. for thirty days from the same date; 2 per cent. for two months; 0.65 per cent. for three months.

Prip also examined 60 discharged patients. One month after discharge 20, or 33 per cent., retained the bacillus; after two months 11, or 18 per cent.; after three months 3, or 10 per cent.; and after twenty-two months 1 person still retained the bacillus.

Glucksam examined 484 convalescents, of whom 267 still had the bacillus in the fauces. Of these 267, 17, or 8 per cent., still retained the bacillus seven days later, and 4, or 1.5 per cent., four weeks later.

Scheller examined 389 convalescents. Of these, 264, or 77 per cent., still retained the bacillus after eleven days; 62, or 18 per per cent., after thirty-one days; 18, or 5 per cent., after sixty-one days; and 8, or 2 per cent., after ninety days.

Drigalski examined infected schools, and found 218 contacts to be carriers. Of these, 8, or 4 per cent., retained the bacillus for over three weeks; and 1, or 0.5 per cent., for over three months.

Tyaden, in 1,338 cases which he examined from the onset or early in the disease, found the bacillus still present after one month in 16.4 per cent., after two months in 0.26 per cent., and after three months in 0.05 per cent.

Graham-Smith collected records of 9,080 cases examined, and calculates that the bacillus is still present after one month in 19 per cent., after two months in 7.2 per cent., after three months in 2 per cent., and over 200 days in 0.02 per cent.

Most of these figures it will be observed do not represent the proportion of cases of diphtheria which retain the bacillus for the various periods of time, but the percentage of convalescents who continue to carry, and as only rather over half the diphtheria patients still retain the bacillus into convalescence, the percentages for the retention of *B. diphtheriae* for the whole number of patients would be about half those given for convalescents.

Taking the figures as a whole it appears that about one-half of the diphtheria patients are free from diphtheria bacilli within two or three days of the disappearance of the membrane, and of the remainder probably 50 per cent. are free in another week or ten days.

At the end of a month from the disappearance of the exudation only 16 to 19 per cent. retain the bacillus, after two months only 5 to 7 per cent., and after three months at most 1 to 2 per cent. These last, the 1 to 2 per cent. who retain the bacillus after three months from convalescence, constitute what may be called the chronic carriers, though the evidence does not point to their being perpetual carriers as in the case of typhoid carriers, for only a very small percentage of healthy carriers carry for six months, as far as is known. Graham-Smith's figures show that only 0 02 per cent. carried for more than two hundred days.

Prip recorded a case of a virulent *B. diphtheriae* being still found after more than three hundred days, and of a *B. diphtheriae* as recognized by its morphology only after four years.

On the other hand, cases of chronic diphtheria chiefly constitute the group of carriers who retain the bacillus for an indefinite period.

The persistence of the bacillus in contacts is much the same as in carriers. Probably the contacts do not retain the bacillus for so long (Kober and Glucksam).

I found in one infected school (Arkwright, 1908) 118 carriers out of 551 contacts examined, or 21 per cent.

Fourteen days later, of 91 examined, 23, or 19.5 per cent., were carriers.

Twenty-eight days later, of 31 examined, 10, or 8.5 per cent., were carriers.

Six weeks later, of 11 examined, 8, or 6.8 per cent., were carriers.

Eight weeks later, of 9 examined, 7, or 6.0 per cent., were carriers.

In another school examined more recently, two swabbings of the whole school (145) showed 10 carriers. All the strains were virulent.

In one case the bacillus persisted till the patient ceased to send swabs—three weeks. One ceased to carry in three weeks. One ceased to carry in six weeks. One ceased after eighty-five days.

The percentage of healthy carriers among those who have recently come into contact with cases of diphtheria varies very much according to circumstances, such as the closeness of contact and the habits and social position of the population examined (cf. Pennington). It has sometimes happened that as many as 20 per cent. of the children in an infected school have been found to harbour *B. diphtheriae*, and Scheller found in several families in which the members were repeatedly examined, that every member became infected sooner or later. On the other hand, in communities where diphtheria has not occurred for some time the percentage of carriers varies from 2.5 to 1 per cent., or in some series of examinations to zero—for example, Ustvedt in certain isolated schools in Norway (86 children), and Scheller. The percentage of virulent *B. diphtheriae* in non-contact communities is very small, say, 0 04 per cent. (Graham-Smith).

Little is known of the cause of persistence of the bacillus. Some observers have pointed out that enlarged tonsils favour prolonged retention of the *B. diphtheriae*. Meikle, who methodically examined a large number of diphtheria convalescents, states that out of 27 persistent carriers 22 had enlarged tonsils. The *B. diphtheriae* has been found in the antrum, sphenoidal and frontal sinuses, and middle ear (Wolff and Councilman, Mallory and Pearce).

Nose.—The figures given above have referred only to observations made by taking swabs from the fauces. The nose has been less frequently examined. Except in cases where there is nasal discharge, the number of carriers in whom the *B. diphtheriae* is confined to the nose is probably small. But Graham-Smith collected records of 5,826 persons examined, amongst whom 2.33 per cent. were found to have *B. diphtheriae* present in the nose only. Pugh found *B. diphtheriae* in the nose of 23 out of 414 scarlet fever patients; 3 of these strains were tested for virulence, and found to be non-virulent. There is greater liability to confuse diphtheria-like bacilli from the nose with *B. diphtheriae*, as various diphtheroids are of more frequent occurrence in the nasal fossae than in the fauces.

Ear.—Graham-Smith isolated 17 strains of *B. diphtheriae* from cases of otorrhoea, and found 11 non-virulent and 6 virulent. The liability to confusion is greater here than in the case of the nose, and the difficulty of isolation is much greater, on account of the saprophytic organisms found in aural discharge.

Treatment of Carriers.

The means at our disposal of freeing the throat or nose from the bacillus in the case of carriers are not very efficient. Diphtheria antitoxin given subcutaneously is of no value for this purpose, according to all observers. Different kinds of antiseptic gargles have not given encouraging results when tested methodically; and the use of antibacterial serum locally, though recommended by Louis Martin and also prepared by Wassermann for the purpose, have not been successful in other hands. Vaccination with killed diphtheria bacilli in increasing doses, first tried on 5 carrier-cases by Petruschky, has not, so far as I am aware, been tried in a large number of cases and deserves further trial, but the few recorded cases which I have met have been quite inconclusive. Operative treatment on the tonsils, where these appear to be the seat of the bacilli, seems a hopeful and justifiable procedure. Probably the whole of the tonsillar tissue should be removed as far as possible, as recommended by Pegler. A prophylactic dose of antitoxin should be given before the operation. It has been recommended that the tonsils should be painted with some chemical substance, such as iodine, which will cause a local inflammation and lead to destruction of the bacilli by the inflammatory exudate, and also their extrusion from suppurating tonsillar follicles. In any case antiseptic gargles, etc., should be used frequently with the view of lessening the spread of the bacilli to others.

The nature of the immunity from the disease which the carriers enjoy is obscure, but it is not always complete nor as persistent as the bacilli. Carriers may develop diphtheria after tonsillotomy or operation on the turbinated bones, and, without any known localized wound, may suddenly develop the disease after carrying the bacillus for three or four weeks (Scheller). Prophylactic doses of antitoxin may cause similar temporary immunity with presence of bacilli in the fauces, and later an attack of diphtheria may occur—for example, 21 contacts were injected prophylactically by Peters, of whom 7 developed diphtheria after three weeks.

It is at first sight remarkable that so few cases of diphtheria occur in schools in which, perhaps, 7 per cent. of the children have *B. diphtheriae* in their throats.

On the other hand, numerous cases are known of the disease resulting from short contact with a healthy carrier or with cases of chronic diphtheria. However, even those in close contact with diphtheria cases often escape the disease, and very frequently only one or two members of a numerous household are attacked with recognizable diphtheria where isolation is not practised.

Ustvedt only observed 3 secondary cases from 98 persons suffering from diphtheria. Cases of chronic fibrinous rhinitis give rise to singularly few cases of clinical diphtheria, although virulent *B. diphtheriae* can be readily isolated from them. Lack examined 37 cases of fibrinous rhinitis and isolated virulent *B. diphtheriae*, but from none of them—nor, indeed, from 50 cases in all—could he hear on careful inquiry of any case of diphtheria originating. Other observers, however, have recorded instances in which severe cases of diphtheria have resulted from contact with a case of membranous rhinitis. In the case of school carriers, it seems likely that some are far more dangerous than others, for if a school class is swabbed only in part, and therefore probably only a certain number

of the carriers are isolated, this partial removal of carriers is often sufficient to stop an epidemic.

The following question arises practically. Taking an otherwise healthy person who is a carrier of *B. diphtheriae*, as shown by the ordinary methods of swabbing serum tubes and examination of a film, is he necessarily a danger to his surroundings unless isolated?

The relative efficiency of different carriers must be taken into consideration, and, further, the possible value of antiseptic gargles in preventing the distribution of the bacilli. This has, as far as I know, never been sufficiently inquired into and tested, but undoubtedly some carriers have living virulent *B. diphtheriae* in their mouths within an hour or two of active antiseptic treatment.

Does a diagnosis of the *B. diphtheriae* by examination of a film from a young serum culture definitely decide the dangerous nature of this bacillus? With the greatest care and experience bacilli resembling virulent *B. diphtheriae* are sometimes found in the fauces or nose which are non-virulent for guinea-pigs and produce no toxin capable of killing a guinea-pig. (These bacilli are at the time, therefore, probably non-pathogenic for man.) What is the nature of these bacilli, and can those who harbour them pass on diphtheria?

These bacilli which resemble *B. diphtheriae* morphologically are not all of the same kind and should be classified in accordance with the scheme of Park and Beebe, advocated by Graham-Smith, namely:

1. Bacilli which do not ferment glucose.
2. Bacilli which do produce acid from glucose, which are non-virulent for guinea-pigs, but resemble virulent *B. diphtheriae* in every other respect.
3. Bacilli which ferment glucose and are virulent for guinea-pigs.

1. Rarely a bacillus of the Hofmann type resembles a virulent *B. diphtheriae* morphologically. When isolated, such a bacillus is easily distinguishable by the fact that it does not ferment glucose.

2. Certain other bacilli occur which closely resemble *B. diphtheriae* morphologically, but have different characters when grown on solid media. I have come across several such in supposed carriers, which when isolated are easily distinguishable from *B. diphtheriae* by the opacity of the growth on agar and by the fact that they ferment cane sugar as well as glucose.

3. Besides the above, strains are met with which resemble the true *B. diphtheriae* in every respect, but which are quite non-pathogenic for guinea-pigs in ordinary doses and produce none or only very small quantities of specific diphtheria toxin.

Graham-Smith has very carefully discussed the question of the nature of these non-virulent *B. diphtheriae*, and he points out that they occur, when a large number of observations are collected, in from 1 to 2 per cent. of all healthy persons not in contact with diphtheria. Graham-Smith's and Cobbett's figures for the occurrence of these non-virulent *B. diphtheriae* among "contacts" do not exceed this proportion of 1 to 2 per cent. Graham-Smith therefore suggests that the non-virulent *B. diphtheriae* is a distinct bacillus and bears no relation to diphtheria.

The percentage of carriers of non-virulent *B. diphtheriae* among healthy persons who are not "contacts" varies considerably, however, according to different observers, and the proportion of "contacts" who harbour non-virulent *B. diphtheriae* has been found to be much higher in some epidemics than in others. Graham-Smith and Cobbett found no evidence of the occurrence of strains of *B. diphtheriae* of intermediate grades of virulence between full virulence and complete absence of virulence for guinea-pigs. In some epidemics of diphtheria, on the other hand, a considerable number of partially virulent strains have been found. Pennington found in an infected school 9 per cent. of carriers, made up of 3 per cent. of carriers of non-virulent *B. diphtheriae*, 1 per cent. of carriers of fully virulent *B. diphtheriae*, and 5 per cent. of carriers of *B. diphtheriae* of only slight virulence. The standard of virulence was, however, not that used by Graham-Smith and Cobbett; but the difference between the three classes seems so marked that it would probably have come out if the method of testing had been different.

In 1908, in the *Journal of Hygiene*, I recorded the results of the investigation of an epidemic of diphtheria in a school. I found a high proportion of non-virulent and of partially virulent strains among the diphtheria bacilli isolated from the carriers. Of 590 boys, 23 per cent. yielded *B. diphtheriae*. Twenty strains were isolated and tested for virulence, and if these strains were a fair sample of the whole, then,

7 per cent. of the boys harboured non-virulent strains.
6 per cent. of the boys harboured partially virulent strains.
7 per cent. of the boys harboured fully virulent strains.

Although very careful observations made by Park and Williams and others have shown that, as a rule, the strain of *B. diphtheriae* isolated from a patient retains its virulence up to the latest date at which it is possible to find it in that patient's fauces, still, sometimes a strain isolated from a case of diphtheria proves to be non-virulent. Lubowski (1900) found, amongst other diphtheria cases, two diphtheria patients from whom he could only isolate non-virulent strains of *B. diphtheriae*, and he found unusually high antitoxin content in the blood of both these patients. Pennington found on examining 25 diphtheria convalescents that 22 yielded virulent strains of *B. diphtheriae* and 2 non-virulent strains five to seven days after the end of their illness. One convalescent yielded at first a virulent strain and later a non-virulent strain.

In the school epidemic mentioned above, the first case of severe sore throat occurred in a boy who had returned to school before I examined the boys. He had suffered from a thin purulent nasal discharge for the greater part of the time since his illness. It seemed highly probable that he was responsible for a large share in the spread of the disease. On several occasions, however, the only strain of *B. diphtheriae* which could be isolated was completely non-virulent, although in all other respects exactly resembling typical virulent *B. diphtheriae*. Similar strains were isolated from his fauces and his nose. The evidence for the transformation of true non-virulent *B. diphtheriae* into virulent *B. diphtheriae* or the reverse is scanty and unsatisfactory. I have tried very many methods, but have completely failed to change the one type into the other.

Occasionally, however, a strain on being tested has proved non-virulent, whereas on a former occasion the same strain has been virulent. When this has occurred, the change has not been referable to any special treatment or external condition, and has been permanent.

All the non-virulent strains with which I have worked have been completely non-pathogenic unless injected in massive doses intraperitoneally, and then antitoxin has not had any neutralizing effect when given beforehand or simultaneously.

Although I have not been able to obtain any direct evidence of toxin or toxoid produced by non-virulent strains, still the injection of filtrate from one non-virulent strain into a horse caused a decided rise in the antitoxin content of the horse's serum—from $\frac{1}{6}$ to 4 units—and the further injection of filtrate from cultures of another non-virulent strain further raised the antitoxic value of the serum to 25 units per c.cm. (Arkwright, 1910).

It does not seem, therefore, to be definitely settled whether *B. diphtheriae*, which are typical in every way except that they are non-virulent, have any close causal relationship to cases of diphtheria or not. Very probably they are less likely to cause diphtheria in man than virulent *B. diphtheriae*, for the circumstances under which they regain their virulence—if they do so—are quite unknown.

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ON THE INTERPRETATION OF THE PRECIPITIN REACTION.

By Drs. D. A. WELSH and H. G. CHAPMAN.

(From the Laboratories of Physiology and of Pathology in the University of Sydney.)

THE different phenomena of immunization are but different aspects of the response of the animal body to the introduction of alien substances within its tissues, and the precipitin reaction is one form of this response. When the blood serum of an animal that has received repeated

injections of some alien protein is mixed outside the body with a solution of this alien protein, then precipitation may occur. This, apparently one of the simplest of the immunity reactions, is yet one of the hardest to interpret. We do not propose to discuss what corresponding property has been acquired by the blood *in vivo*, nor what is its relation to the general defensive mechanism.[1] It is with the interaction of antiserum and antigen, indicated by a precipitate *in vitro*, that we are now concerned.

From the beginning we have looked upon the reaction as taking place between known weights of the interacting substances. In our later work the weighing of the precipitate marks a further advance in accuracy. The remarkable nature of the precipitate is thus revealed. For, if our interpretation be correct, the precipitate is formed mainly of those constituents of the antiserum that give the antiserum its specific precipitable character. It is probable that the specific antisubstance (precipitin) brings down with it from the antiserum non-specific molecules (for example, complement) which also go to form the precipitate. It is probable also that the antigen enters to a relatively slight extent into the composition of the precipitate But all our work tends to show that the main mass of the precipitate is composed of antisubstance (precipitin) which can be weighed. A ponderable antisubstance has hitherto been unknown, but in the precipitate of a precipitin reaction we have a remarkably near approximation to such a substance.

PHENOMENA OF PRECIPITATION.

(*a*) *Relation of Antiserum to Precipitate.*—The original interpretation of the precipitin reaction was that the antiserum contained "coagulin" or "precipitin," which had the power of throwing the antigen (homologous protein) out of solution. "Très généralement, en effet, le sérum d'un animal d'espèce A, injecté de sérum d'espèce B, précipite ce sérum B."[2] It was admitted that some portion of the precipitate might be derived from the antiserum.[3 4 5 6] It was also said that the precipitin combined in equivalent quantities with the antigen to form the precipitate.[7] Nevertheless, the fundamental assumption was made that the main source of the precipitate was the antigen (homologous protein), which was therefore known as the "precipitable substance." It was suggested that the precipitin reaction was analogous to bacterial agglutination, and that, in some similar manner, precipitins agglutinated and precipitated protein molecules from solutions of the antigen.[8 9]

At an early stage of our work on precipitins we found that this interpretation of the reaction was not borne out by experiment. It has long been known that the precipitin reaction is one of extreme delicacy—that recognizable precipitates may be obtained with minute traces of the antigen (homologous protein) in solution. We have been able to go a step further, and to show that recognizable precipitates can be obtained from a mixture of antiserum and antigen, although the total amount of protein in the antigen solution is too small to be revealed by any chemical precipitant of protein.[11 12] Obviously the visible precipitate cannot have come from the invisible amount of antigen. It must, therefore, have been derived from the antiserum.

At a later stage we obtained corresponding results with quantities of antigen and of precipitate that were large enough to be measured by weight.[13] Thus 1 mg. hen egg-white (antigen) interacting with 52 c.cm. of antiserums for hen egg white yielded a precipitate weighing 25.9 mg., and the superfluid still contained antigen in solution. Obviously again a precipitate weighing more than 25 mg. cannot have been derived from an amount of antigen weighing only 1 mg. and still recognizable in the superfluid. The antiserum must therefore be the main source of the "precipitate substance."*

Further study of the reaction by weighing the precipitates[14 15] has shown that the weight of the precipitate is directly proportional to the amount of antiserum, and independent of the quantity of antigen, provided that the antigen is in sufficient quantity to yield the full precipitate from the amount of antiserum employed. With this proviso, if, in a series of tubes, 1 c.cm., 2 c.cm., 3 c.cm., etc , antiserum, interact with 100 mg. antigen in a volume of 50 c.cm. saline solution, the dried precipitates will show the ratio in their weights of 1, 2, 3, etc.; and the superfluids removed from the deposits will yield no further precipitate on the addition of antigen. With the same proviso, the weights of the precipitates will be the same, and will show the same ratio as the amounts of antiserum, although the quantity of antigen be increased to 200, 300, 400, or 500 mg. or be diminished to 50 mg. These gravimetric experiments demonstrate what our earlier work has indicated[12 16]—that each cubic centimetre of antiserum has a definite "precipitable content" which may be thrown from solution by a certain amount (or concentration) of the antigen.† We have already explained that "precipitable content" is not necessarily equivalent to "precipitin," since the "precipitin" may carry down with it non-specific molecules from the antiserum.

A few illustrative experiments are recorded in the following Table I. The interactions were conducted in aseptic conditions, and were allowed to proceed for forty-eight or for seventy-two hours, when the deposits were carefully separated, washed, dried, and weighed.‡ The nature of the protein used to immunize the rabbit and to interact with the resultant antiserum is given under the heading "Antigen and Antiserum."

TABLE I.

No.	Antigen and Antiserum	Volume of Antiserum.	Weight of Dried Protein (Antigen).	Volume of Saline Solution.	Weight of Precipitate.	Weight of Precipitate per c.cm. Antiserum.
		c.cm.	mg.	c.cm.	mg.	mg.
1	Horse serum 57...	2.5	100	50	3.7	1.5
2	Horse serum 57...	2.5	100	50	3.5	1.4
3	Hen egg-white 59	2.0	134	50	8.6	4.3
4	Hen egg-white 59	3.0	134	50	12.5	4.2
5	Hen egg-white 59	4.0	134	50	16.7	4.2
6	Horse serum 53...	2.5	50	50	2.0	0.8
7	Horse serum 53...	3.0	200	50	4.0	0.8
8	Horse serum 56 ..	3.0	100	50	10.4	2.1
9	Horse serum 56...	10.0	100	50	20.0	2.0

Incidentally, these observations show that the precipitable content of different antiserums varies greatly, from 0.8 mg. to 4.2 mg. per c.cm. of antiserum in those under consideration.

The conclusion that the precipitate must be composed mainly of constituents of the antiserum has been endorsed by Adami[17] and by Arrhenius,[18] who states, apropos of the interaction of small quantities of sheep serum and its antiserum, "Der Haupttheil des Präzipitäts stammt danach wahrscheinlich aus dem Präzipitin."

(*b*) *Total and Partial Interactions.*—One reason for the divergent views held by other observers lies in the failure to discriminate between total and partial interactions. It is a common experience that when increasing quantities of antigen interact with a fixed amount of antiserum, increasing amounts of precipitate may be obtained, the usual inference being that each increment of precipitate is derived from each increment of antigen. We find, however, that this observation holds good only up to a certain point, which varies for each antiserum. After a certain quantity (and concentration) have been reached, no further precipitate is obtainable from a given amount of antiserum by any further addiment of antigen. We interpret this to mean that it is possible to discharge practically the whole of the precipitable content of an antiserum by a sufficiency of antigen, and we distinguish this as a total interaction.

Different antiserums, however, vary greatly in respect of the amount (and concentration) of antigen required to yield this maximal precipitate from fixed amounts of the antiserums. This we have expressed by saying that antiserums are characterized by different degrees of

* Moll[32] and Rodet[33] had independently reached a similar conclusion.

† We have not yet sufficient evidence to decide whether the amount (equivalent quantities) or the concentration of the antigen determines the precipitation from the antiserum.

‡ A more detailed account of our procedure is given in reference [14], from which these tables are taken, and also in reference [15].

precipitability. When the antigen is insufficient to give the maximal precipitate from the antiserum, then the interaction is only partial, and further additions of antigen will continue to give further precipitates until the full precipitate has been thrown out. Many precipitin antiserums are characterized by high precipitability, and are, therefore, likely to give such partial interactions.

Our earlier experiments on these lines, based on the volumetric estimation of small precipitates, are supported by our later results of weighing larger precipitates. Two illustrative experiments are given in Tables II and III. In each experiment constant volumes of an antiserum (prepared in a rabbit with hen egg-white) were allowed to interact with increasing weights of antigen (dried hen egg-white), and the precipitates at forty-eight hours were washed, dried, and weighed. A different hen egg antiserum was used in each experiment.

TABLE II.

No.	Volume of Antiserum.	Weight of Antigen.	Volume of Saline Solution.	Weight of Precipitate.	Weight of Precipitate per c.cm. of Antiserum.
	c.cm.	mg.	c.cm.	mg.	mg.
1	3	1.44	50	1.0	0.33
2	3	3.6	50	1.5	0.5
3	3	7.2	50	2.0	0.67
4	3	14.4	50	2.7	0.9
5	3	28.8	50	4.2	1.4
6	3	144.0	50	6.5	2.2

In the first experiment (Table II) the amount of deposit continued to augment with each increase of the antigen, and the whole of the precipitable substance was not thrown out of 3 c.cm. of the antiserum by nearly 29 mg. of the antigen. This antiserum is characterized by a considerable precipitable content (at least 2.2 mg. per c.cm. of antiserum), and high precipitability. It is just the kind of antiserum that lends support to the common view of the precipitin reaction, since in the earlier partial interactions (Nos. 1 to 5) the weight of precipitate is increased with increasing weights of antigen.

TABLE III.

No.	Volume of Antiserum.	Weight of Antigen.	Volume of Saline Solution.	Weight of Precipitate.	Weight of Precipitate per c.cm. of Antiserum.
	c.cm.	mg.	c.cm.	mg.	mg.
1	2	14.4	50	3.2	1.6
2	2	36.0	50	3.5	1.75
3	2	144.0	50	3.4	1.7
4	2	432.0	50	3.4	1.7

In the second experiment (Table III) 14 mg. antigen served completely to precipitate the content from 2 c.cm. antiserum; and further increments of antigen, even to thirtyfold, did not increase nor diminish the weight of precipitate. This antiserum is characterized by a moderate precipitable content (about 1.7 mg. per c.cm. of antiserum) and a relatively low precipitability. In these total interactions the weight of precipitate is independent of the weight of antigen.

These observations show that it is only in partial interactions that the weight of the precipitate alters with the weight of antigen (cf. Table II). In a total interaction the precipitate has reached a maximal weight, and does not vary with further additions of antigen (cf. Table III).

(*c*) *Relation of Antigen to Precipitate.*—When a fixed quantity of the antigen, however minute, is allowed to interact with successive amounts of the antiserum, the antigen is not completely removed from the superfluid. In many of our experiments with quite small amounts of antigen and relatively large amounts of antiserum, we had no evidence that the antigen was sensibly diminished. We found that the superfluids were capable of interacting again and again to yield similar precipitates with fresh addiments of antiserum and that, as the concentration of antiserum increased, the precipitate also tended to increase.* [12]

In the interactions of ponderable quantities of antigen with antiserum we have no direct evidence of the amount of antigen present in the precipitate; but the following facts indicate that it is a quantity small in comparison with that derived from the antiserum. (1) Each cubic centimetre of antiserum has a definite precipitable content, and the weight of precipitate is proportional to the weight of antiserum (vide supra). (2) The maximal weight of precipitate from a given amount of antiserum is the same whether it is discharged by a single quantity or by successive smaller quantities of antigen.[15] (3) In total interactions the weight of precipitate is independent of the weight of antigen (vide supra). (4) In partial interactions the weight of precipitate may be many times greater than the weight of antigen when the quantity of the latter is small—for example, 1 mg. or 5 mg.[13 15] These observations are not inconsistent with the hypothesis that antigen and antiserum combine to form the precipitate, but they indicate that it is erroneous to speak of the precipitin of the antiserum precipitating the antigen; in other words, they indicate that the antigen is not the true precipitable substance.

Arrhenius and Hamburger [20] have brought forward evidence in favour of the interaction taking place between equivalent quantities of antigen and of precipitin. Their experiments do not appear to be opposed to ours. They deal rather with another aspect of the question, studied in different experimental conditions. Arrhenius † [22] states that the precipitate formed with small quantities of antigen must be composed mainly of precipitin, and, from his equation of equilibrium

$$\frac{A-P}{V} \times \frac{B-P}{V} = K$$

it follows that his large precipitates must contain proportions of antigen and antiserum similar to those contained in his small precipitates. Thus a small precipitate of 2 units (P = 2) contains 2 equivalents of A (antigen) and 2 equivalents of B (precipitin); and a large precipitate of 64 units (P = 64) contains 64 equivalents of A and 64 equivalents of B. If, as Arrhenius states, the small precipitate is composed mainly of precipitin, then, on his own hypothesis, the large precipitate is in the same ratio composed of precipitin. Arrhenius [23] also points out that the precipitates deviating complement in the "deviation test of Moreschi" must be derived mainly from precipitin, a fact which we fully recognize.[24]

The experiments of Von Dungern,[25] P. T. Müller,[26 27] Fleischmann and Michaelis,[28] have led them to the view that a diminution of both components of the precipitate (antigen and antibody) occurs in the interaction, and that in favourable circumstances both components may be completely removed from the solution. The precipitate is therefore composed of an insoluble compound of both components, neither of which acts as a ferment on the other. If a considerable mass of precipitin reacts with a small mass of "precipitable substance," the precipitate is formed of much precipitin and little "precipitable substance." If mean masses of both substances interact, the precipitate contains both components in equal proportion.

Von Dungern [25] mixed constant amounts of antiserum with ascending quantities of antigen. He then tested the superfluids above the precipitates for precipitin and for "precipitable substance." To this end he added a drop of antiserum and a drop of antigen to separate drops of each superfluid. With the microscope he sought twenty minutes later for a precipitate, and in each series he found a "middle zone" in which the superfluid gave no precipitate with antiserum nor with antigen. He concluded that in this "middle zone" of the series the precipitate contained the whole of the precipitin and antigen of the original mixtures. He also made certain adsorption experiments to show the variable composition of the precipitate.

We have carried out many thousands of interactions of the type employed by Von Dungern, and we have tested the superfluids with both antiserum and antigen.[12 16] But we have found that in every case the subsequent addition of antiserum has led to the formation of a further precipitate. The subsequent addition of antigen has, or has not, yielded a precipitate, according as the original interaction was partial or total (vide supra). We would draw attention to the larger quantities of superfluid examined by us, and the much greater time—frequently forty-eight hours—allowed for interaction.

P. T. Müller [26] has compared the effect of lactoserum on milk with the coagulation of caseinogen by rennin. He has shown that lactoserum precipitates casein, and in

* An interesting corroboration is supplied by Hunter,[19] who, working with precipitins for snake venom, found that the toxicity of his superfluids was not diminished at the end of a precipitin reaction.

† Arrhenius [21] had previously said: "This seems to indicate that the whole quantity of the albuminous substances in A (antigen) and only a small part of those in B (precipitin) enter into the precipitates."

many other ways resembles rennin—for example, precipitation by lactoserum is dependent on the presence of the salts of lime, or certain other divalent elements. The close similarity between the actions of lactoserum and rennin indicates that antiserums prepared by injection of milk differ fundamentally in their action from antiserums prepared with blood serum and egg-white.

Phenomena of Inhibition.

We have elsewhere discussed our interpretation of this phenomenon and the bearing of our experiments on Ehrlich's hypothesis.[29 30] If inhibition were brought about by inactive precipitin (precipitoid) interacting with molecules of antigen, and thus preventing the precipitating action of any active precipitin that may be added, then it should be possible to overcome the inhibition by an excess of antigen, thus providing disengaged molecules to interact with the active precipitin. But in our experiments, when inhibition was complete, we have never been able to overcome the inhibition by any further addition of antigen. (In these experiments the amount of antigen originally present was sufficient to discharge the greater part of the precipitable content of the antiserum). In similar circumstances we have usually been able to overcome the inhibition by a further addition of antiserum—an observation which by itself is not inconsistent with Ehrlich's hypothesis and the theory of mass action.

When regard is paid to the exact amounts of the interacting substances in an inhibition experiment, further difficulties arise, since unheated antiserum is never able completely to neutralize the antigen, while the same quantity of heated antiserum may completely inhibit precipitation from like quantities. It would, then, be necessary to assume that the combining affinities of precipitoid could be effectively distributed over a much greater number of molecules of antigen than could those of precipitin.

Without going into detail, we may say that our results are consistent with the hypothesis that a heated inhibitory antiserum acts not on the antigen, nor on the antiserum, but on the product of their interaction—the precipitate—and that inhibitory action is of the nature of a solution of precipitate.[29 30] There appears to be a quantitative relation between the amount of heated antiserum and the amount of precipitate that it will inhibit (dissolve). The fact that inhibition cannot be overcome by excess of antigen (the original antigen being sufficient to neutralize the greater part of the antiserum) is explained by our finding that, in these circumstances, no marked increase of precipitate occurs. The further fact that, in similar conditions, an increase of unheated antiserum can overcome the inhibition, is consistent with our finding that there is always sufficient antigen left to produce fresh precipitates with fresh addition of antiserum. We may add that our precipitation[11 31] and inhibition[29 30] experiments with closely-related heterologous proteins support our interpretation of the interaction of antiserums with specific antigens, and so strengthen our general position.

Conclusions.

1. The main mass of the precipitate is formed by constituents of the antiserum.

2. There is a close relationship between the weight of precipitate and the amount of the antiserum (cf. Table I).

3. In total interactions the weight of precipitate is independent of the weight of antigen (cf. Table III).

4. In partial interactions the weight of precipitate is conditioned by the quantity of antigen (cf. Table II).

5. It is therefore erroneous to speak of the precipitin of the antiserum coagulating the antigen, or to regard the antigen as the precipitable substance.

6. Inhibition phenomena are inconsistent with the hypothesis that precipitoid is developed, but are consistent with the finding that heated antiserums act directly on precipitate by specific solvent action.

7. Our interpretation of the precipitin reaction appears to have important practical bearings

(*a*) On the identification of the specific origin of proteins, and on the separation of closely related species ([11 31]);

(*b*) The determination of the value or morphological characters of the orders, genera, and species of plants, as suggested by one of us ([24]);

(*c*) On the improvement of methods for testing the interaction of antigen and antiserum by the deviation of complement.

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STUDIES IN THE ANAËROBIC CULTURE OF THE INTESTINAL MICRO-ORGANISMS.

By W. J. Penfold, M.B.,

British Medical Association Research Scholar,

(From the Lister Institute of Preventive Medicine.)

In the course of an investigation on the variation of intestinal organisms it was thought advisable to ascertain if any variations could be obtained by anaërobic methods of culture. This appeared the more desirable as it is generally admitted that the intestinal canal must have a very low oxygen pressure.

If the anaërobic state produced any definite variations, it seemed probable also that such would take place within the body. Again, the chemical action of the intestinal organisms in the anaërobic state, as opposed to the aërobic, is but little understood, and many of the published results are contradictory.

Technique Employed.—The Bulloch anaërobic chamber was used for this work. In all experiments it was more or less exhausted, so that by ascertaining the degree of exhaustion at the end of the experiment any leak in the apparatus could be readily detected. This is necessary since the apparatus as obtained directly from the instrument maker is apparently rarely gas-tight.

The estimation of the degree of anaërobiosis (as in one particular experiment) was made as follows: Height of barometer, 760 mm. of Hg; height of the manometer communicating with the anaërobic chamber, 700 mm. of Hg—difference 60 mm. This is diminished by the vapour tension of water at the temperature of the apparatus, for example, 17 mm. at 68° F. This in the case in point gives a remainder of 43 mm., one-fifth of which represents oxygen.

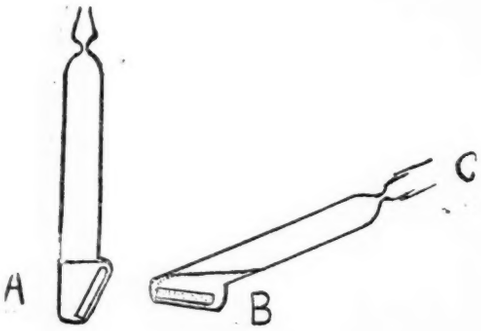
The leakage of air should not amount to more than 10 mm. of mercury, in which case the pressure of oxygen will vary not more than 2 mm. between the beginning and the end of the experiment. In favourable cases I have found the leak to represent not more than 2 mm. of air in four days. The same luting used with the new instruments shows about 100 to 500 mm. leak after 24 hours at 37° C. It is difficult in the latter case to say whether the growth effects are due to the great exhaustion in the beginning of the experiment or the great leak taking place after further incubation. With leaks such as one gets with good apparatus, for example, 5 mm. only (about one-fifth of which is oxygen), the results are fairly accurate.

Drying of the plates is very troublesome in a chamber containing pyrogallic acid in strong potash. This is obviated by placing a dish of water over the pyrogallic solution. If partial anaërobic states are used without pyrogallic, the bottom plate comes out frequently with a large quantity of water floating on it, so that it is advisable to have one or two empty plates on the bottom of the chamber. The plates do not require to be inverted in the chamber. If they are inverted and a hand-pump is used for exhaustion, the agar frequently falls off. A water pump attached to the tap is most satisfactory for exhaustion.

Since the oxygen tension in broths is difficult to ascertain, I confined my work mainly to plate culture. A quarter of an

hour's exhaustion of a broth tube at a particular pressure, with vigorous shaking during the whole time, does not induce a state of equilibrium between the tension of gas in the fluid and the space above it. Sealing the tubes after such an exhaustion is followed by further liberation of gas.

That exhaustion of broth by means of the air-pump occurs very slowly can be readily shown by the use of an anaërobic gas-tube, designed as shown in Fig. A. If the tube be exhausted



in the tilted position (see Fig. B), any dissolved gas in the inner tube escapes. If the exhaustion take place at an air pressure of 30 mm. of mercury and is accompanied by vigorous shaking, it will be found that after fifteen minutes a position of equilibrium has not been obtained. This can be shown by sealing the neck of the tube and putting it into the erect position, when gas will continue to be given off and will collect in the gas-tube. This renders it difficult to determine at what pressure of oxygen the organisms in broth are growing.

Again, plates which are poured after seeding will show growth in anaërobic conditions which will prevent the growth of surface cultures. The surface of the agar conforms more strictly to the anaërobic state of the chamber than the substance of the agar. On this account I used surface inoculations regularly.

Another advantage of plates as opposed to fluid media is that, in the anaërobic state, the former will give sharp and definite changes in reaction in cases where such changes do not show up well in the broth. This is probably due to the fact that the total volume of growth is too small in some cases to produce sharp well-defined alterations in reaction in the whole mass of the culture as in broths, but will do it quite well when concentrated on definite points of a plate.

For anaërobic states superior to those got by simple exhaustion with an ordinary water pump, exhaustion and refilling with hydrogen is satisfactory. This is repeated two or three times as required. The most strict anaërobic states used in these experiments have been got by simple exhaustion, repeated refilling with hydrogen, and the use of pyrogallic acid in 30 per cent. potash solution.

Attention to the above points of technique gives constant and satisfactory results. The use of lactose-bile-salt-agar was first tried in this anaërobic work, when I found that the *B. typhosus* would not grow on it in an exhausted chamber containing pyrogallic acid and 30 per cent. potash. This made it necessary to ascertain first of all the oxygen pressure required by the different intestinal organisms for their growth. Surface inoculation of glucose-agar was used, and the following results obtained:

Surface Inoculation of Glucose Agar Plates.

Degree of Anaërobiosis.	
1. Exhaustion; filling twice with hydrogen and re-exhaustion with addition of pyrogallic acid and caustic potash (30 per cent. solution). (The apparatus must be gas tight.)	Gaertner's bacillus, *B. typhosus*, *B. dysenteriae* (strains Kruse and Flexner) will not grow under these conditions.
2. 1 mm. oxygen	*B. typhosus*, *B. dysenteriae* (strains Kruse and Flexner), *V. cholerae*, *B. coli*, Morgan's No. 1 bacillus all grow at this oxygen pressure. *B. alcaligenes* does not.
3. 7 mm. oxygen	The results got at this pressure were similar to those obtained at 1 mm., that is, all organisms specified grew except *B. alcaligenes*.
4. 16 mm. oxygen	At this pressure all grew, including *B. alcaligenes*.

Result.—Some of the above organisms at least are not facultative anaërobes in the strict sense. *B. alcaligenes* requires a comparatively high oxygen tension for growth.

Lowering the oxygen tension diminishes the size of the colonies of the organisms. This diminution is a little more marked in the case of *V. cholerae* than the other above-mentioned organisms. The thinness of the colonies is a striking feature of anaërobic growth in most of the organisms tested, especially *B. typhosus* and *B. dysenteriae* (Kruse).

From the above results it followed that strict anaërobiosis was not desirable in endeavouring to find variations or other anaërobic phenomena of interest applying to the pathogenic intestinal organisms.

It is now well known that papillae formation on colonies frequently indicates variation, and this was first sought for and obtained in great perfection in the case of the *B. coli* on MacConkey's medium.

B. coli on MacConkey's medium (lactose-bile-salt-agar with neutral red) gives after two days' anaërobic growth at 1 mm. oxygen pressure intensely yellow colonies. After four to five days' growth these colonies are papillated. The papillae are large and numerous. Aërobic controls on the same medium show only red colonies during the whole time with no definite papillae. The yellow colour is also produced by *B. coli* anaërobically in neutral red lactose-bile-salt-peptone water. If the yellow broth be made acid to litmus the colour does not change markedly. If air be drawn through the broth for five minutes it still remains yellow, which would not be the case if ordinary reduction had taken place. In plates which have stood in the cold room for two to three days the yellow colour tends to disappear.

I find that on replating after propagation in anaërobic broth and growing anaërobically this papillae-forming power is lost. We seem to have here an adaptation to the particular oxygen pressure on this medium in which process a few selected cells rapidly outgrow all the rest. These new cells give rise to smooth colonies. The strict analogy between papillae-formation following the addition of chemicals to the media and that accompanying partial anaërobiosis leaves little room for doubt that we have an anaërobic variation. Bile-salt must be present to give this effect.

B. typhosus was next tried on the same medium. *B. typhosus* on bile-salt-lactose with neutral red does not, like *B. coli*, give rise to papillae formation at any of the oxygen pressures I have worked with.

It produces at 1 mm. of oxygen, however, strongly acid colonies (red), a phenomenon which it seemed advisable to investigate. The range of oxygen pressure giving this effect is very narrow. It is easily got at 1 mm., but at 7 mm. of oxygen I have never been able to obtain the effect. It was at first thought to be an anaërobic fermentation of the lactose, but further work showed that it occurred without the presence of the lactose. It really depends on the bile salt (commercial sodium taurocholate). The action was also found to be common to the *B. dysenteriae* (Kruse and Flexner strains) and Gaertner's bacillus. *B. alcaligenes* cannot produce the acidity, as it fails to grow at this pressure.

To elucidate further these effects produced by the growth of *B. typhosus* and *B. coli* on bile-salt it was thought desirable to work with taurin, glycocol, sodium cholalate, and pure sodium taurocholate, any of which might perhaps account for these effects. Taurin and glycocol only have so far received any attention from me, as they are easily obtained in the pure state. A necessary preliminary to such an investigation was to observe carefully the effect of *B. typhosus* and *B. coli* on the medium which formed the basis of the above experiments.

The Action of B. Coli on Peptone.

Plates of the following composition were used: Agar, 2 per cent.; peptone (Witte), 2 per cent.; solution of neutral red (1 in 100), ½ per cent.; sodium chloride, ½ per cent. Made up with tap water and rendered faintly alkaline to litmus.

B. coli grown on above, in ordinary air gives a distinctly alkaline reaction of the colonies and plates. With a tension of oxygen equal to 26 mm. of mercury the alkali production is much less though the growth is luxuriant; at 7 mm. it is very slight, and at 2 mm. it is indistinguishable. *B. typhosus* has a similar effect, but the alkali formation aërobically is not quite so great.

We see, then, that no acid reaction appears with either organism growing on peptone only at any oxygen pressure, nor have I observed papillae-formation.

Glycocoll.—**If a medium of the following composition: Agar 2 per cent., peptone (Witte) 2 per cent., lactose 1 per cent., solution of neutral red (1 in 100) ½ per cent., sodium chloride ½ per cent., made up with tap water and rendered faintly alkaline to litmus, has added to it ⅛ per cent. glycocoll, it will be found that the *B. typhosus* will not grow on it aërobically, while control inoculated plates put into the anaërobic chamber immediately after inoculation will grow luxuriantly.**

Medium.	Typhoid Strain.	Aërobic Plates.	Plates at 16 mm. of Oxygen.	Plates at 1 mm. of Oxygen.	Aërobic Plates of Lactose Agar, with no Glycocol.
Lactose agar + ⅛ per cent. glycocoll	"Delépine"	Two colonies	Four brown colonies	Crowded plates with pale brown centres	Crowded plates of colonies with no pigmentation.
,,	"Guy"	No colonies	Three colonies	,,	,,
,,	"Lincoln"	,,	Ten colonies	,,	,,
,,	"McConn"	Four colonies brown in colour	Over 200 colonies all showing brown pigmentation	Crowded plates with deep brown centres	,,

General Conclusion.—Evidently the strain McConn is much less sensitive than the other strains, since it grows well at a pressure of 16 mm. of oxygen.

In the accompanying table are shown the results obtained with four strains of *B. typhosus* on media containing glycocoll.

Strength of Glycocoll Required.

If lactose agar be used as the basis of the medium, ⅛ per cent. glycocol is sufficient to prevent the aërobic growth of *B. typhosus*. In the absence of lactose I have found that ⅛ per cent. does not suffice but that ½ per cent. is required. With 1 per cent. glycocoll-agar without lactose a similar effect is produced, but the plates must be got quickly into the anaërobic chamber, otherwise they will not grow. The *V. cholerae* is inhibited aërobically by ⅛ per cent. glycocoll-agar without lactose. *B. coli* and Gaertner's bacillus require a higher concentration of glycocoll to stop their aërobic growth.

Nature of the Phenomenon.

If inoculated aërobic plates which had not grown after two days are then placed in the anaërobic chamber no growth occurs. Reinoculation is necessary, in which case they will grow anaërobically. This suggests that the previous incubation in the presence of air has not caused the formation of any direct poison.

Twelve plates of ⅛ per cent. glycocoll-agar were inoculated with *B. typhosus* strain "Guy," and divided into four groups of three each. The first group was put into the anaërobic chamber immediately on inoculation and all grew. The second group was then incubated aërobically for fifteen minutes and transferred to the anaërobic chamber, when no growth resulted. The third set after three hours and the fourth, after twenty-four hours' aërobic incubation, also failed to grow when placed in the anaërobic chamber. All the above plates were put up at the same oxygen pressure anaërobically—namely, 1 mm.

If 5 c.cm. of a ½ per cent glycocoll solution in peptone water be inoculated with 72 mg. of a forty-eight hours' broth culture of *B. typhosus*, subculture in broth can be readily made during the first one to two hours, but not after eighteen hours. If the same quantity of organisms be put on a ½ per cent. glycocoll plate and subcultures are made therefrom into broth, they will be found to die out much more quickly than in the peptone water. This may be due to the comparatively small amount of oxygen in contact with the organisms in peptone water.

With *B. typhosus* the results with glycocoll are constant, but with other organisms it occasionally happens that both aërobic and anaërobic plates do not grow. By working rapidly, however, and employing a suitable concentration of glycocoll I have got the effect also with *B. dysenteriae* (Kruse), *B. dysenteriae* (Flexner), B. No. 1 Morgan, *B. paratyphosus* A, *B. paratyphosus* B, *B. aertryck*, *V. cholerae*, Gaertner's bacillus, and *B. coli*. With the latter two the effect is somewhat inconstant.

All the above give a deep brown colour reaction on glycocoll media under conditions admitting growth. It takes two to four days to appear usually.

It was thought that this antiseptic effect might be due to the production of formaldehyde from the glycocoll, in which case glycollic acid—hydroxyacetic acid—would probably be an intermediate product. This idea was based on the possibility that the organism might act similarly to yeast on leucin. Glycollic acid agar (½ per cent.) gave, however, no such difference with *B. typhosus*, *B. dysenteriae* (Flexner), or *V. cholerae*, so that this experiment does not support the view that the organism has formed formaldehyde.

It was observed that peptone agar with ½ per cent. glycocoll shows after standing on the bench a bleaching of the upper inch of the agar; below this there is a dark zone of about ½ in. in depth, while underneath the glycocoll medium retains its normal greyish-yellow colour. If the medium be kept at freezing point this change does not occur. If kept at 37° C. it occurs much more quickly than at room temperature. This it was thought, might have something to do with the difference, and accordingly agar which had undergone this change was used for anaërobic culture of *B. typhosus* and other organisms, when they were found to grow almost as well as on the new material.

The nature of the aërobic antiseptic influence of glycocoll seems at present obscure.

B. typhosus on taurin agar was not found to give any acidity at different oxygen pressures, so that the acid reaction of *B. typhosus* on bile salt media anaërobically is probably not due to taurin in any way. Other separate bile constituents have not yet been tried in order to account for this anaërobic fermentation of bile salt by *B. typhosus*, but I am continuing the research on this subject.

CONCLUSIONS.

1. *B. coli* and *B. typhosus* produce alkali from peptone aërobically. By lowering the oxygen tension the amount of alkali formed may be progressively diminished until at 1 mm. of oxygen the colonies are quite neutral in reaction.

2. *B. coli* forms papillae on bile-salt-lactose-agar anaërobically. These appear very prominently at a pressure of 1 mm. of oxygen. By continued anaërobic growth this papillae-forming power may be lost. The analogy between this phenomenon and papillae-formation aërobically on carbohydrates suggests that we have here to do with an anaërobic variation.

3. *B. typhosus* ferments bile salt at low oxygen pressures, but does not do so at a pressure equal to 7 mm. of mercury. This effect is not due to taurin or glycocoll.

4. Glycocoll acts as an antiseptic on many intestinal organisms, notably *B. typhosus*. By pursuing the technique described in the paper, this antiseptic effect may be shown to occur only under aërobic conditions. Under anaërobic conditions, the addition of glycocoll does not inhibit growth.

In the above experiments with glycocoll Kahlbaum's product was employed exclusively. Recently further experiments have been made with the same product after recrystallization, and it would appear that the antiseptic influence of the recrystallized substance is considerably less than that of the commercial glycocoll, and the pigment formation is also less marked. The experiments on this question are being continued.

AN OUTBREAK OF GASTRO-ENTERITIS DUE TO B. PARATYPHOID (B).

By F. A. BAINBRIDGE, M.D., D.P.H., F.R.C.P.,
Lister Institute.

DURING the period of June 10th to 14th, 1910, fourteen people living in four households had symptoms of acute gastro-enteritis, namely, vomiting, diarrhoea, abdominal pain and collapse. The onset was sudden, the diarrhoea was profuse, and the stools were of a characteristic *green* colour; fever was present in all the patients, and lasted from three to seven days, the temperature ranging from 101° to 103° F. No spots, enlargement of the spleen, or other symptoms suggestive of typhoid fever were observed. Two of the patients were very ill indeed and in all

convalescence was slow, and was retarded by attacks of circulatory failure in at least three patients.

Three specimens of faeces were obtained. One was practically sterile, but the other two yielded a bacillus which, in cultural characters, its agglutination and absorption reactions, was identical with *B. paratyphoid* B.

Blood was obtained from six of the patients, and was found to agglutinate both the bacillus isolated from the faeces and standard strains of *B. paratyphoid* B in dilutions ranging from 1-200 to 1-400.

It seems highly probable, therefore, that the outbreak was caused by the paratyphoid bacillus.

It was at first supposed that infected food was responsible for the outbreak, but no article of food had been eaten by all the patients, and the dates of onset and distribution of the illness were at variance with this view. The fact that the cases occurred in several households, and that the only link between the different households was that visits had passed between them at the time of the outbreak, suggested the possibility of a paratyphoid carrier infection.

The outbreak is of interest since attacks of acute gastro-enteritis caused by *B. paratyphoid* B have not been previously recorded in this country.

RECOGNITION OF B. TYPHOSUS BY COMPLEMENT FIXATION.

By H. R. DEAN, M.B., B.Ch.,
Lister Institute.

THE object of these experiments has been to ascertain if it is practicable to recognize by the complement fixation method the presence of small quantities of typhoid bacilli in the mixed growth obtained on plates inoculated with an emulsion of faeces.

The cases examined have been taken from among the series of typhoid carriers, or suspected carriers, examined by the usual bacteriological methods at the Lister Institute. The results obtained by me have been controlled by the results obtained by the isolation and identification of the bacteria on the customary sugar media, and I have great pleasure in recording my thanks to Dr. Ledingham for controlling my results by the isolation of typhoid in pure culture, as well as for the great interest he has taken in these experiments. The independent control thus afforded to my observations has been of the utmost service to me. The method was as follows:

Three Petri capsules of MacConkey's medium (neutral red bile salt, lactose agar) were inoculated with an emulsion of the faeces. These were the actual plates used in the bacteriological examination of the faeces, and were not subjected to any special treatment. After twenty-four hours' growth the first plate, which was in the majority of cases thickly covered with a mixed growth, was treated as follows: The entire growth on the plate was rapidly emulsified in 3 c.cm. of distilled water. The emulsion was removed with a Pasteur pipette to a test tube, which was placed in the incubator at 37° C. After a period varying from three to twenty-four hours the emulsion was removed from the incubator and frozen hard in an ice and salt freezing mixture. When thoroughly frozen it was returned to the incubator at 37° C. for a further period of time, varying from one to twenty-four hours. The emulsion was then centrifugalized until clear or nearly clear. The clear supernatant fluid was pipetted off and tested for the presence of typhoid antigen with a typhoid immune serum obtained from a horse.

The details of the method are as follows: Each tube contained two and a half cubic centimetres, or five quantities each of half a cubic centimetre.

- 0.5 c.cm. containing extract diluted with physiological saline solution.
- 0.5 c.cm. containing serum diluted with physiological saline solution.
- 0.5 c.cm. of a 1 in 10 dilution of fresh guinea-pig serum.
- 0.5 c.cm. of a 1 in 20 suspension of washed sheep's corpuscles.
- 0.5 c.cm. of a dilution of haemolytic serum (rabbit v. sheep corpuscles).

The haemolytic system was prepared and standardized in the usual way, and from two to three times the minimal haemolytic dose was used. The extract was used in three amounts of 0.3, 0.15, and 0.075 of a cubic centimetre diluted in each case to 0.5 c.cm. The typhoid serum was used in a dose of 0.1 c.cm. diluted to 0.5 c.cm., and the same dose of normal horse serum diluted in a similar fashion was used as a control, with each dose of extract. Further details are best seen from the following example.

TABLE I.

	With Typhoid Serum 0.1.	With Normal Serum 0.1.
	Haemolysis.	Haemolysis.
Extract A:		
0.3	None	Almost complete.
0.15	"	Complete.
0.075	"	"
Extract B:		
0.3	Almost complete	Almost complete.
0.15	Complete	Complete.
0.075	"	"

Controls typhoid serum 0.2 and normal serum 0.2, without bacterial extract. The haemolysis was in both cases complete.

The extract dilutions were first made, the bulk being in each case made up to 0.5 c.cm. with normal saline solution. The extract dilutions were made in duplicate, and to one series was added 0.1 of typhoid serum diluted to $\frac{1}{3}$ c.cm. To the other series was added 0.1 of normal horse serum diluted to $\frac{1}{3}$ c.cm. Control tubes containing double the dose of serum (0.2) diluted to 1 c.cm. were also put up. To every tube was added 0.5 of a 1 in 10 dilution of fresh guinea-pig serum. The tubes were then incubated for one hour at 37° C. At the expiration of one hour there was added to each tube 0.5 of a 1 in 20 suspension of sheep's corpuscles and 0.5 c.cm. of a 1 in 500 dilution of haemolysin. The tubes were then incubated for one hour, and the results read and recorded.

Eighty-five plates were examined by this method, and in 81 cases the result was in agreement with the bacteriological findings. In 66 cases the complement fixation method gave a negative result, and no typhoid colonies could be isolated from the plates. In 15 cases a positive result was obtained, and typhoid bacilli were isolated in culture from the plates. In 4 cases out of 85 the result did not agree with the results obtained by the usual method. In all cases the reaction was very sharp and clearly marked, and no difficulty was experienced in reading the results.

It does not seem necessary to go into any detail as to the method, for no departure was made from the accepted technique of complement fixation except in the matter of the preparation of the bacterial extracts. These extracts, which will be again mentioned, were found to be very uniform, to have a powerful specific action, and to have little tendency to independent absorption of complement; they were, moreover, very easy to make. The optimum time for the making of an extract by this method has not been determined, but the extracts were found to be quite good which had occupied four hours in the making, and extracts which had been allowed a longer time were not appreciably more powerful. In any case, it is quite possible to make a good extract in four hours and to form an opinion as to the presence of typhoid bacilli on the same day as that on which the plates are removed from the incubator.

The results obtained seem to show that the method is accurate, and it is certainly delicate. I have no evidence as yet that it may succeed in cases where typhoid bacilli are too few for detection by ordinary methods, but in several cases from which typhoid bacilli were isolated by cultural methods with considerable difficulty a marked reaction was obtained by the complement-fixation method. The result was, in fact, quite as definite as in cases in which the typhoid colonies on the plate were numerous and obvious. I hope shortly to get more evidence on this point.

As a test of the delicacy of the reaction three agar plates were generously inoculated with *B. coli*. They were then incubated for forty-eight hours, at the end of which time one normal loop of typhoid bacilli was mixed with the growth of one plate, to another was added half a loop, and the third was untouched. Extracts were prepared by emulsifying the growth of each plate with 3 c.cm. of distilled water. The result of the complement-fixation experiment is shown in the following table:

TABLE II.

	Typhoid Serum 0.1.	Normal Serum 0.1.
	Haemolysis.	Haemolysis.
Extract A:		
0.2	None	Complete.
0.1	,,	,,
Extract B:		
0.2	,,	,,
0.1	Slight	,,
Extract C:		
0.2	Almost complete	,,
0.1	Complete	,,

Controls of serum alone:
Typhoid serum 0.2 diluted to 1 c.cm. ... Complete haemolysis.
Normal serum 0.2 diluted to 1 c.cm. ... Complete haemolysis.

Each tube contained the dose of extract diluted with saline to 0.5 c.cm. *plus* the dose of serum diluted with saline to 0.5 c cm., and to each tube was added 0.5 c.cm. of a 1 in 10 dilution of fresh guinea-pig serum. The tubes were incubated for one hour, and then received 0.5 c.cm. of a suspension of sheep's corpuscles, 1 in 20, and 0.5 c.cm. of haemolysin, 1 in 600. The plates A and B, which had received one and half a loop of typhoid bacilli respectively, were very plainly differentiated from C, to which typhoid had not been added.

The result shows that a small quantity of typhoid bacilli can be detected even when mixed with an enormous quantity of *B. coli*. It will be seen from the table that 0.1 c.cm. of extract B, which contained approximately one-sixtieth of a loop of typhoid bacilli, gave a perfectly definite reaction. The recognition of typhoid bacilli in mixed culture by this method is easy and rapid, for a result can be obtained within eight hours of the removal of the incubated plate from the incubator. Moreover, it can be easily combined with the usual cultural methods.

For making the extract I have used the first of the three plates inoculated with the emulsion of faeces. The first plate was, as a rule, overgrown with confluent colonies, and quite useless for bacteriological purposes. In cases in which the colonies were discrete on the first plate, some of the suspicious colonies were picked off before the extract was made.

In 2 cases out of 85 a complement fixation reaction was obtained, but typhoid bacilli were not isolated in pure culture. In these two cases it was not possible to determine whether the serum reaction or the cultural methods had been at fault. Of the other cases no difficulty was at any time experienced in deciding between a positive and a negative reaction. No cases were met with in which a positive reaction was simulated by any organism resembling typhoid. At the same time it is recognized that the number of cases investigated is far two small to exclude this possibility. It is more probable that no organisms of the typhoid group occurred in this comparatively small series of experiments. To settle this point I prepared extracts from plates made with pure cultures of paratyphoid A and B, and from a culture of aertryck. These gave a reaction which was in no way distinguishable from that obtained with a typhoid extract. It seemed to me, however, probable that this was a group reaction, comparable to that seen in agglutination experiments, and that the source of error might be eliminated by accurate dosage of the serum. To test this view it seemed advisable to experiment with extracts prepared from pure cultures of various members of the group.

It is not intended in this paper, which is of the nature of a preliminary communication, to go at all fully into the literature of the subject. It may, however, be mentioned that the specificity of the complement fixation reaction in the case of the typhoid group is at the present time generally acknowledged as the result of the work of numerous authors. The question of specificity as regards the typhoid and the paratyphoid bacilli was settled by the papers of Leuchs and the very interesting results to be obtained by the absorption of the group ambocepter were first recorded by Simnitzky.

The strains of bacilli used in these experiments were tested by the usual sugar tests.

The method of preparing the extract was as follows: A Roux bottle, with an agar surface of about 20 × 10 cm., was freely inoculated and incubated for twenty-four hours. At the end of this time the growth was emulsified in 20 c.cm. of distilled water. The emulsion was put into an incubator at 37° C. for twenty-four hours, at the end of which time it was frozen hard with a mixture of ice and salt. It was allowed to thaw after two hours, and then returned to the incubator for another twenty-four hours, when it was again frozen and thawed. The emulsion was then centrifugalized and a clear or almost clear fluid obtained. The clear fluid was poured off and kept in the cold room, and was found to remain fit for use for at least one month. In those cases in which the extract was not quite clear after centrifugalization it was found that a deposit settled to the bottom of the flask after a few days, leaving the supernatant fluid quite clear.

The extracts made in this way gave good results with the complement fixation method, and were very free from any tendency to absorb complement spontaneously. It will be noticed that the extract was not heated above 37° C. at any period during its manufacture; nevertheless, cultures made from the clear fluid immediately after centrifugalization were either sterile or showed only one or two colonies. The extracts were almost invariably found to be sterile after they had been a few days in the cold room.

TABLE III.

		Typhoid Serum, 0.1 c.cm.	Typhoid Serum, 0.025 c.cm.	Normal Serum, 0.1 c.cm.
		Haemolysis.	Haemolysis.	Haemolysis.
	Typhoid Extract "M" c.cm.			
1	0 1	None	None	Complete
2	0.05	,,	,,	,,
3	0 025	,,	,,	,,
4	0 0125	,,	,,	,,
5	0.00625	,,	Trace	,,
6	0 003125	Trace	Almost complete	,,
7	0.0015625	Marked	Complete	,,
8	0.00078125	Almost complete	,,	,,
9	0.000390625	Complete	,,	,,
	Paratyphoid A Extract			
1	0.1	None	Trace	Complete
2	0.05	,,	Almost complete	,,
3	0.025	,,	Complete	,,
4	0.0125	,,	,,	,,
5	0 00625	,,	,,	,,
6	0.003125	Trace	,,	,,
7	0.0015625	Almost complete	,,	,,
8	0.00078125	Complete	,,	,,
9	0.000390625	,,	,,	,,
	Paratyphoid B Extract "Sch."			
1	0.1	None	None	Complete
2	0 05	,,	Almost complete	,,
3	0.025	,,	Complete	,,
4	0 0125	,,	,,	,,
5	0.00625	Trace	,,	,,
6	0.003125	Slight	,,	,,
7	0.0015625	Almost complete	,,	,,
8	0 00078125	Complete	,,	,,
9	0.000390625	,,	,,	,,

Controls:
Typhoid serum (without extract) 0.2 ... Complete haemolysis.
Normal serum (without extract) 0.2 ... Complete haemolysis.

To each tube was added 0.5 of a 1 in 10 dilution of fresh guinea-pig serum, and, after incubation for one hour, 0.5 c.cm. of a 1 in 20 suspension of washed sheep's corpuscles and 0.5 c.cm. of a 1 in 600 dilution of haemolysin. The extracts used in these experiments were prepared at the same time and by the same method from approximately equal amounts of fresh cultures.

In this experiment it will be noted that with a dosage of 0.1 c.cm. typhoid serum it is impossible to differentiate between typhoid extract and extracts prepared from paratyphoid A and B. When, however, the dose of serum is reduced to 0 025, the positive reaction with the paratyphoid extracts almost disappears, while the reaction with typhoid extract is reduced only to a very small extent. A very similar result is shown in the following experiment:

TABLE IV.

		Typhoid Serum, 0.1 c.cm.	Typhoid Serum, 0.25 c.cm.	Normal Serum, 0 1 c.cm.
		Haemolysis.	Haemolysis.	Haemolysis.
	Typhoid Extract "T." c.cm.			
1	0.1	None	None	Almost complete
2	0.05	,,	,,	Complete
3	0 025	,,	,,	,,
4	0.0125	,,	,,	,,
5	0.00625	,,	Slight	,,
6	0.003125	Trace	Almost complete	,,
7	0.0015625	Slight	Complete	,,
8	0.00078125	Complete	,,	,,
9	0.000390625	,,	,,	,,
	Paratyphoid B Extract "Mac."			
1	0.1	None	Marked	Almost complete
2	0.05	,,	Complete	Complete
3	0.025	,,	,,	,,
4	0.0125	,,	,,	,,
5	0.00625	,,	,,	,,
6	0.003125	,,	,,	,,
7	0 0015625	Slight	,,	,,
8	0 00078125	Almost complete	,,	,,
9	0.000390625	Complete	,,	,,
	Aertryck Extract.			
1	0.1	None	Slight	Almost complete
2	0 05	,,	Marked	Complete
3	0.025	Trace	Complete	,,
4	0.0125	Slight	,,	,,
5	0.00625	Marked	,,	,,
6	0.003125	Almost complete	,,	,,
7	0.0015625	Complete	,,	,,
8	0.00078125	,,	,,	,,
9	0 000390625	,,	,,	,,

The controls of typhoid serum 0.2 c cm , and normal serum 0.2 c.cm., without extract, in either case showed complete haemolysis.

To each tube was added 0.5 c.cm. of a 1 in 10 dilution of fresh guinea-pig serum, and after one hour's incubation, 0.5 c.cm. of a 1 in 20 suspension of sheep's corpuscles and 0.5 c.cm. of haemolysin 1 in 300.

These experiments show that in complement fixation, as in agglutination, there is a group reaction which, when the antiserum is used in large amount, tends to mask the specific reaction between typhoid antibody and typhoid antigen. The complement fixation by a typhoid extract and typhoid antiserum is an extremely delicate and specific reaction, to demonstrate which it is, however, necessary to adjust carefully the proportions of the ingredients. In this case a dose of 0 025 c.cm. gives, under the conditions mentioned, a reaction with typhoid extract which is little short of the maximum, while the reaction with the other members of the group almost disappears.

In the following experiment an attempt was made still further to demonstrate the specific nature of the reaction.

Two Roux bottles, which had been inoculated with a culture of typhoid, and two which had been inoculated with a culture of paratyphoid B, were incubated for twenty-four hours. The growth was then washed off from each pair of bottles with about 200 c.cm. of saline solution. The emulsions were then centrifugalized, and deposits of washed bacilli were obtained. To each deposit was added 20 c.cm. of a 1 in 5 dilution of typhoid serum, and the thoroughly emulsified mixtures—serum and bacilli—were left for one hour in the cold room. The mixtures were then rapidly centrifugalized, and the almost clear serum mixtures were at once decanted. There were thus obtained an antityphoid serum which had been acted on by typhoid bacilli for one hour in the cold, and an antityphoid serum which had been similarly treated with paratyphoid B bacilli. These serums were then compared with a specimen of the same antityphoid serum, similarly diluted but otherwise untreated.

TABLE V.

		Typhoid Serum Untreated 0.1 c.cm.	Typhoid Serum Previously Absorbed with Paratyphoid B 0.1 c.cm.	Typhoid Serum Previously Absorbed with Typhoid 0.1 c.cm.	Normal Serum.
		Haemolysis.	Haemolysis	Haemolysis.	Haemolysis.
	Typhoid Extract M. c cm.				
1	0.1	None	None	Almost complete	Complete.
2	0 05	,,	,,	Complete	,,
3	0.025	,,	,,	,,	,,
4	0.0125	,,	Trace	,,	,,
5	0.00625	Trace	Almost complete	,,	,,
6	0.003125	Almost complete	Complete	,,	,,
7	0.0015625	Complete	,,	,,	,,
8	0.00078125	,,	,,	,,	,,
9	0 000390625	,,	,,	,,	,,
	Paratyphoid A Extract.				
1	0.1	None	Almost complete	Almost complete	Complete.
2	0.05	,,	Complete	Complete	,,
3	0 025	,,	,,	,,	,,
4	0.0125	Trace	,,	,,	,,
5	0 00625	Almost complete	,,	,,	,,
6	0 003125	Complete	,,	,,	,,
7	0 0015625	,,	,,	,,	,,
8	0.00078125	,,	,,	,,	,,
9	0.000390625	,,	,,	,,	,,
	Paratyphoid B Extract.				
1	0.1	None	Almost complete	Almost complete	Complete.
2	0 05	,,	Complete	Complete	,,
3	0.025	,,	,,	,,	,,
4	0 0125	Trace	,,	,,	,,
5	0 00625	Almost complete	,,	,,	,,
6	0 003125	Complete	,,	,,	,,
7	0 0015625	,,	,,	,,	,,
8	0 00078125	,,	,,	,,	,,
9	0 000390625	,,	,,	,,	,,
	Serum alone.				
	0.2	Complete	Almost complete	Almost complete	Complete.
	0.1	,,	Complete	Complete	,,

To each tube was added 0 5 c.cm. of a 1 in 10 dilution of fresh guinea-pig serum. The experiment was incubated for an hour, and there were subsequently added 0.5 c.cm of a 1 in 20 suspension of sheep's corpuscles and 0.5 c.cm. of a 1 in 400 dilution of haemolysin.

From this experiment it appears that absorption with paratyphoid B removes the group antibody from an antityphoid serum, and that a serum treated in this way gives no complement fixation with extracts of either paratyphoid A or B, while the reaction with typhoid extract is only slightly reduced. It will be noticed that previous treatment of antityphoid serum with paratyphoid B extract

removes not only the antibodies for paratyphoid B, but also the antibodies for paratyphoid A.

On the other hand, previous treatment with typhoid bacilli removes the amboceptor for typhoid as well as for paratyphoid A and B. I hope to be able to continue these experiments, and more especially in the direction of the recognition of typhoid bacilli in mixed culture.

THE SERUM TREATMENT OF DYSENTERY:

WITH NOTES ON THE BACTERIOLOGICAL DIAGNOSIS OF DYSENTERY.

By Drs. M. A. Ruffer and J. Graham Willmore.

(From the Laboratories of the Conseil Sanitaire Maritime et Quarantenaire d'Egypte.)

In this paper we propose to give a short account of:

1. The preparation of polyvalent antidysenteric serum and the monovalent serum against the *B. dysenteriae* El Tor No. 1 described by us at the Belfast meeting last year.[1]
2. The biochemical properties of these serums.
3. The differential diagnosis of "dysentery" by laboratory methods.
4. A summary of the results of the treatment of 138 cases of dysentery during the present year, and a comparison of the mortality-rate of cases before and after the introduction of the serum treatment.

Preparation of Antidysenteric Serum.

(*a*) Horses No. I and II were inoculated with a mixture of cultures composed of:

5	strains of	B. Shiga-Kruse No. 1.
8	,,	B. El Tor No. 1.
5	,,	Pseudo D. (Kruse).
4	,,	Flexner, including B. Pseudo A. (Kruse).
2	,,	as yet unidentified dysentery bacilli.

The cultures were prepared by growing the bacilli on stock agar slopes for forty-eight hours at 37° C., emulsifying in 0.9 per cent. saline solution, mixing, and heating to 56° C. for one hour.

(*b*) Horses III and IV were inoculated with ten strains of *B. dysenteriae* El Tor No. 1, isolated from patients at El Tor and Alexandria.

(*c*) Horse No. V was inoculated with a culture of *B. pseudo-dysentericus* D (Kruse), kindly sent to us by Professor Dr. Kruse.

The growth from one large agar tube was emulsified in 1 c.cm. of physiological saline, and the doses, expressed in cubic centimetres, therefore represent the number of tubes of mixed vaccine. The initial dose given in June, 1909, was 0.5 c.cm. of the dead vaccine; the inoculations were made every ten to fifteen days, and the amount increased until by the middle of August a dose of 20 c.cm. was injected. At the end of August each horse then received 1 c.cm. of living organisms, the inoculations being repeated in increasing doses until by the middle of November 80 c.cm. of the living virulent cultures were given as a dose. The horses were then allowed to rest for one month before bleeding.

With Horse No. VI an entirely different method was adopted. A strain of El Tor No. 1, isolated in Alexandria, which produced a violent reaction when the killed culture was injected subcutaneously into a horse in a dose of half an agar tube, was grown for forty-eight hours on 15 agar tubes. (This strain killed a rabbit in twenty-four hours when inoculated intravenously in doses of a quarter of an agar tube.) The growth was emulsified and killed by heat, and then digested with pepsine and 0.2 per cent. HCl for twenty-four hours. The mixture was then rendered slightly alkaline with NaOH solution, and the entire amount given as an initial injection intramuscularly on October 30th. On November 11th 30 tubes similarly treated were given. On November 22nd a small amount of blood was withdrawn, and on the 23rd 80 tubes, digested, were injected.

The serum was found to agglutinate the bacillus completely in dilutions up to 1 in 1,000, and incompletely up to 1 in 2,000.

When mixed with the living culture in the proportion of 2 c.cm. of serum to one agar tube of living bacteria and inoculated into rabbits intravenously, the rabbit invariably survived. When mixed in the proportion of 1 c.cm. and ½ c.cm. of serum to one agar tube of living bacteria, the result was inconstant, some animals surviving and others succumbing.

Normal horse serum in the proportion of 1 to 2 c.cm. to one agar tube of bacilli was found to have no protective action, the animals which received the above mixtures all dying within twelve hours. A starting point in connexion with the injections of digested vaccine was the absence of the usual phenomena of reaction which followed the injection of untreated vaccine. This in spite of the large amounts injected and the rapidity with which the doses were increased; the rise of temperature was insignificant, there was hardly any swelling or tenderness at the points of inoculation, and the horse did not go off his feed or appear to be in any way affected.

On December 4th, 1909, eighty agar tubes of the living virulent bacilli were injected intramuscularly. Hardly any reaction followed; the temperature rose from 37.8° to 39.8°, and fell the next day to 39°. By the seventh day the temperature was normal. On the morning of the 6th there was very little swelling and no oedema, and the horse was eating well. Serum from blood withdrawn on December 2nd protected a rabbit, in doses of 1 c.cm., against six minimal lethal doses of living bacilli inoculated intravenously.

After our return from El Tor the inoculations were continued; commencing with a dose of 40 c.cm. in April, 1910, the amount was increased to 160 c.cm. for horses Nos. I and II, and to 240 c.cm. for horses III and IV in June, 1910, without any ill effect being produced. The immunity conferred by the first set of inoculations was therefore of satisfactory duration.

Subcutaneous and intramuscular injections only were employed, as during some experimental work in 1908 two of our horses died suddenly with symptoms resembling those of anaphylaxia, after receiving intravenous injections.[2] The virulence of the cultures was maintained when necessary by passage through rabbits and guinea-pigs, though this procedure was avoided as far as possible in view of the statement by Shiga that subcultures from the first generation are "more effective in the preparation of serum than the bacillus obtained after passage through animals."[3]

In the preparation of the mixed vaccine the proportions of each strain were chosen on the basis of the ratios of their virulence when inoculated into rabbits. The quantity of each culture injected into the horse was therefore in inverse ratio to the virulence of that culture, and it was hoped that by these means the horse's organism would respond by the production of equal quantities of antibodies for each group.

As will be seen when we discuss the protective properties of the serums, this hope was not realized, far larger amounts of antibodies being formed for the Shiga-Kruse No. 1 group than for any of the others. The agglutinins, on the other hand, were constant. In all the horses, with the exception of the horse No. VI (El Magnûn), the injections were followed by violent reactions.

The phenomena observed were:

1. A rise of temperature, usually amounting to 2° or 3° C., and lasting about forty-eight hours.
2. Diffuse swelling and inflammatory oedema, which usually spreads a considerable distance from the point of inoculation. When this subsides, a fluctuating swelling, lasting about seven days, is left at the area of inoculation. (If this be aspirated, a thin creamy pus containing degenerated dysentery bacilli and leucocytes is withdrawn. If this pus be then heated for one hour to 56° C., centrifugalized, and the clear liquor puris decanted off, the latter is found to be very strongly antimicrobic and antitoxic.)
3. Anorexia and general malaise. The areas round the points of inoculation are acutely sensitive.
4. Occasionally a little diarrhoea and, on one occasion at least, haematuria were observed. These symptoms pass off in twenty-four to forty-eight hours.

Biochemical Properties of the Serums.

Table No. I shows the agglutination reactions of the various strains of dysentery bacilli—some isolated in 1909 and some in 1910—with polyvalent serum. For the agglutination reaction of the above with El Tor serum see our paper read at the Belfast meeting.[4]

In testing the protective power of serum, 1 c.cm. was mixed with the living virulent bacillary emulsion in varying proportions and left in the incubator for two hours at 37° C.

The mixtures were then agitated and inoculated into rabbits and guinea-pigs, intravenously and intraperitoneally.

The minimal lethal dose of each emulsion was determined on each occasion by inoculating control animals under the same conditions as the animals inoculated with the serum and emulsion mixtures. Table II shows the prophylactic powers of the serums.

Controls were also made by inoculating animals with mixtures of bacillary emulsions and normal horse serum; the latter was found to possess no protective properties.

Living bacillary emulsion was used, as it has been shown by numerous observers[5] that serum prepared by inoculating horses with bacillary emulsion and that prepared with filtered toxins possess identical antitoxic and antimicrobic properties; further, of the various cultures used by us only those of the Shiga-Kruse No. 1 group furnished a soluble toxin.

The same results were obtained with killed bacillary emulsion.

TABLE I.

The types of bacilli in this and the following tables are classified according to their agglutination reactions with saturated serums.

Type of Bacillus and Name in Register.	Serum 1 in 50.	Serum 1 in 100.	Serum 1 in 200.	Serum 1 in 500	Serum 1 in 1,000.	Serum 1 in 2,000.
Bacillus Shiga-Kruse No. 1:						
K.S.	+ 3	+ 3	+ 3	+ 3	+ 1	–
49 (1909)	+ 3	+ 2	+ 1	±	–	–
Negri	+ 3	+ 3	+ 2	+ 1	±	–
Shiga-Kruse	+ 3	+ 3	+ 3	+ 2	+ 1	–
Y.g.p.p 2 (1909)	+ 3	+ 3	+ 3	+ 2	+ 1	–
B. dysentericus El Tor No. 1:						
157 IV (1908)	+ 3	+ 3	+ 3	+ 3	±	–
39 (1909)	+ 3	+ 3	+ 2	+ 1	±	–
Aut. 167 (1909)	+ 3	+ 3	+ 3	+ 3	±	–
14 R.E.T. (1909)	+ 3	+ 3	+ 3	+ 3	+ 2	±
44 (1909)	+ 3	+ 3	+ 3	+ 2	±	–
22 R.H.B. (1909)	+ 3	+ 2	+ 2	+ 1	±	–
96 g.p.p. (1910)	+ 3	+ 3	+ 3	+ 2	+ 1	–
B. pseudo-dysentericus D. (Kruse):						
——	+ 3	+ 3	+ 2	+ 1	–	–
2 up. (1909)...	+ 3	+ 2	+ 2	+ 1	±	–
68 R.H.B. (1909)	+ 3	+ 3	+ 3	+ 1	±	–
37 (1909)	+ 3	+ 3	+ 3	+ 3	+ 2	+ 1
Mahmûd (1910)	+ 3	+ 3	+ 3	+ 2	±	–
B. dysentericus (Flexner):						
——	+ 3	+ 3	+ 3	+ 2	–	–
B. pseudo-dys. A. (Kruse) ...	+ 3	+ 3	+ 2	+ 1	–	–
12 up. (1910)	+ 3	+ 3	+ 3	+ 2	+ 1	±
163 (1910)	+ 3	+ 3	+ 2	+ 1	±	–
172 (1910)	+ 3	+ 3	+ 3	+ 3	+ 1	±
Unidentified:						
162 up. (1909)	+ 2	+ 2	+ 2	+ 1	±	–
136 (1910	+ 2	+ 3	+ 2	+ 1	±	

– = Reaction negative.
+ 3 = Complete agglutination and precipitation of bacteria. Liquid remains clear on shaking.
+ 2 = Agglutination and precipitation of bacteria. At rest, liquid clear, but slightly turbid on shaking.
+ 1 = Agglutination of bacteria, without clarification of liquid.
± = Slight agglutination of bacteria only.

As will be seen from a consideration of Table II, the polyvalent serum gave by far the best results against the B. Shiga-Kruse, No. 1. The failure of the Polyvalent, El Tor, and Pseudo-D. serums to show a higher protective standard against the El Tor and Pseudo D. organisms is disappointing, particularly as the first two of these serums gave most encouraging results as therapeutic agents against these infections in human patients. It may be mentioned, however, that different animals of the same weight and species varied so much in their susceptibility to infection by these bacilli that it was difficult to arrive at any true idea of the value of the different serums by laboratory methods.

With regard to the curative properties of these serums, it was found that if an animal be inoculated with a certain number of minimal lethal doses, and the serum be injected after the onset of symptoms—diarrhœa and paralysis—death is in all cases delayed, but never averted; many animals, however, showed a surprising temporary improvement.

Tables III and IV show the general reduction in the mortality under serum treatment, and the classification of the cases by laboratory methods of diagnosis.

Clinically the purely bacillary cases are divided into:

1. Gangrenous cases (nearly all gangrenous cases are complicated with nephritis, myocarditis, and bronchopneumonia often with malignant tertian malaria as well).
2. Chronic cases, subdivided into (*a*) simple chronic, (*b*) complicated chronic.
3. Subacute, simple and complicated.
4. Acute—mild, severe, simple, and complicated.

The serum-treated cases are divided as follows:

A. Cases of double bacillary infection, by B. Shiga and B. Tor: Gangrenous, 8; chronic, 4 (of which 3 were complicated); subacute, 5; acute, 3. Total, 20.

B. Cases of double bacillary infection, by B. Flexner and B. Tor: Gangrenous, 0; chronic, 1 (complicated); subacute, 9; acute, 1. Total, 2.

C. Cases of single bacillary infection, by B. Shiga: Gangrenous, 6; chronic, 3 (of which 1 was complicated); subacute, 2; acute, 4. Total, 15.

D. Cases of single bacillary infection, by B. Tor: Gangrenous, 16; chronic, 9; subacute, 3; acute, 7. Total, 35.

A case was considered to be gangrenous when the following conditions were present:

1. The passage of extremely offensive green, greenish-brown, or black stools containing altered brown blood, and green or black sloughs of varying dimensions and characters. These sloughs may be large—in some instances dark-green tubular sloughs more than a foot long were passed—or intimately mixed up with muco-pus and altered blood, giving the stool the appearance of mashed spinach, a purée of green peas, or a cup of chocolate.

TABLE II.

Serum.	Dose.	Bacillus.	Test Animal.	By Intravenous Inoculation.	By Intraperitoneal Inoculation.	Maximum Number of Minimal Lethal Doses Protected against Constantly.	Remarks.
Polyvalent	1 c.cm.	Shiga-Kruse No. 1	Rabbit	+	+	60	Constant—both as to protection and as to minimal lethal dose in controls.
Polyvalent ...	1 c.cm.	B. Tor No. 1 (1910)	„	+	+	4	In some instances 1 c.cm. protected against 10 minimal lethal doses.
	2 c.cm.	„	„	+	+	10	
Polyvalent	1 c.cm.	„	Guinea-pig		+	(?) 20	Reaction inconstant. Great variation in lethal dose in controls.
Polyvalent	1 c.cm.	B. Flexner (172, 1910)	Rabbit	+	+	8	
Polyvalent	1 c.cm.	B. pseudo-D. (Mahmûd)	„	+	+	6	Larger doses often withstood.
El Tor	1 c.cm.	Shiga-Kruse No. 1	„	+	+	0	
El Tor	1 c.cm	B. Tor No. 1 (1910)	„	+	+	10	
El Tor	1 c cm	„	Guinea-pig		+	24	In several instances, but not invariably, 1 c cm. protected against 40 minimal lethal doses. Vide supra.
El Tor	1 c.cm.	B. pseudo-D. (Mahmûd)	Rabbit	+	+	4	Larger doses occasionally supported.
	2 c.cm.	„	„	+	+	10	
Pseudo-D. (Horse V) ...	1 c.cm	Shiga Kruse No. 1	„	+	+	0	
Pseudo-D. (Horse V) ...	1 c.cm.	B. Tor No. 1 (1910)	„	+	+	6	
Pseudo-D. (Horse V) ..	1 c.cm.	B. pseudo-D. (Mahmûd)	„	+	+	4	In many cases animals survived 8 minimal lethal doses.

2. Constitutional symptoms of profound toxinaemia, evidenced by dyspnoea, a very rapid (120 to 160), thready, almost imperceptible pulse, dry brown or glazed red tongue, facies Hippocratica, subnormal temperature, subcutaneous ecchymoses, algid extremities, husky voice, and utter collapse.

These cases always emit a very unpleasant, musty, death-like odour which is very characteristic. The urine was either suppressed, or scanty and albuminous.

A chronic case was so classified when the probable onset of infection dated from three weeks to a month or more previous to admission.

The stools consisted of a certain amount of brown or yellowish muco-faeces, mixed with sloughs, muco-pus, and blood. The patient was usually emaciated, with sometimes a varying degree of oedema of the ankles and feet, and presented signs of a varying degree of toxinaemia. The urine was usually scanty, high-coloured, and contained varying amounts of albumen.

TABLE III.

Date:	1907.	1908.	1909.	1910.
Total number of pilgrims ...	43,271	29,446	20,333	16,736
Total number of deaths ...	423	336	254	113
Percentage total deaths to total number of pilgrims ...	1 (−)	1.14	1.25 (−)	0.67
Total dysentery admissions...	—	155	212	138
Total dysentery deaths ...	—	82	134	45
Percentage dysentery deaths to dysentery admissions ...	—	53	63	32.6
Cases in which Amoebae were Present.				
Total number	—	—	4	55
Deaths	—	—	2	32
Case mortality per cent, ...	—	—	50	58.1
Purely Bacillary Cases.				
Total number	—	—	208	74
Total deaths	—	—	134	8
Case mortality per cent. ...	—	—	64.4	10.8
Total serum-treated	—	—	12*	72
Deaths in serum-treated ...	—	—	0	7
Case mortality per cent. ...	—	—	0	9.7
Purely Amoebic Cases.				
Total number	—	—	—	32 (23.2 per cent.)
Total deaths	—	—	—	19
Case mortality per cent. ...	—	—	—	60 (−)
Total serum-treated	—	—	—	12
Deaths in serum-treated ...	—	—	—	11
Case mortality per cent. ...	—	—	—	91.6
Mixed Amoebic and Bacillary Infection.				
Total number	—	—	—	23 (16.6 per cent.)
Total deaths	—	—	—	13
Case mortality per cent. ...	—	—	—	60 (−)
Total serum-treated	—	—	—	13
Deaths in serum-treated ...	—	—	—	8
Case mortality per cent. ...	—	—	—	42.1
Undiagnosed Cases.				
Total number	—	—	—	9 (6.5 per cent.)
Total deaths	—	—	—	5
Case mortality per cent. ...	—	—	—	5.5
Total serum-treated	—	—	—	6
Deaths in serum-treated ...	—	—	—	2
Case mortality per cent. ...	—	—	—	33.3

*Picked Cases.

NOTE.—Among the total number of serum-treated bacillary cases five patients died either from causes other than dysentery, or else death occurred in less than twelve hours after the first injection of serum. Excluding these cases, we therefore get the following figures: Bacillary cases serum-treated, 67; deaths, 2; case mortality, 3 (−) per cent.

TABLE IV.—*Table Showing Classification of Cases by Laboratory Diagnosis.*

Infection	Total Number of Cases.	Percentage.	Total Deaths.	Case Mortality.	Serum-Treated. Number.	Deaths.	Case Mortality.
Triple infection: Amoebae, B. Shiga, B. Tor	10	7.2	6	60%	10	6	60%
Double infection by Amoebae + B. Shiga	4	3.8	1	25%	3	0	0%
Double infection: Amoebae + B. Tor	8	5.7	5	62.5%	5	1	20%
Double infection: Amoebae + B. Flexner*	1	0.7	1	100%	1	1	100%
Double infection: B. Shiga + B. Tor	20	14.4	3	15%	20	3	15%
Double infection: B. Tor + B. Flexner	2	1.4	0	0%	2	0	0%
Single infection: B. Shiga	15	10.8	2	13.3%	15	2	13.3%
Single infection: B. Tor†	36	26.8	3	8%	35	2	5.7%
Single infection: B. Pseudo D. (Kruse)‡	1	0.7	0	0%	0	0	0%

* This case died of angina pectoris. He was also suffering from malignant tertian malaria.
† This case, to which serum was not administered, was moribund on admission.
‡ Very mild case.

A subacute case was so classified when the probable onset of infection dated from ten to twenty days previous to admission.

The stools usually consisted of very little muco-faeculent material, muco-pus, sloughs, and blood; often the stools consist entirely of muco-pus, giving the appearance—according as to whether they are blood-stained or not—of raspberry fool or crême d'orge. The constitutional symptoms vary with the virulence of the infection and the resisting power of the patient.

An acute case was considered to be one in which the probable date of onset was within ten days of admission.

The stools in these cases usually consisted of blood, mucus, and small sloughs, preceded by a preliminary serous diarrhoea, and followed by liquid serous blood-stained stools resembling water in which raw meat had been washed (*raclure de boyeau*). These cases usually presented signs of severe toxinaemia, as evidenced by a rapid small pulse, high temperature (39° to 40° C.), albuminuria—though the quantity of urine was not as a rule much diminished—and prostration. Pain of a colicky cramping nature, referred particularly to the region over the transverse colon, was always a prominent symptom, while tenesmus was often absent and always insignificant—a condition in sharp contrast to that seen at the onset of acute amoebic dysentery.

All recovered under massive injections of serum.

In other milder cases the symptoms of toxinaemia, while always present, were not so severe, the temperature as a rule was not so high and the prostration not extreme. On the other hand, the stools were scantier, more numerous, and accompanied by tenesmus and sharp shooting pain in the left iliac fossa, which was sensitive to pressure. There was usually no albuminuria. It was this type of case which, if untreated, would pass on to the subacute and chronic varieties, while the one previously described became gangrenous.

The routine treatment of each case was as follows:

As soon as possible after admission a specimen of the stools unmixed with urine was sent to the laboratory, where it was examined for amoebae. Plates of Conradi-Drigalski's medium, and later of "special" medium, were then sown and examined for colonies of dysentery bacilli at the end of twenty-four to forty-eight hours' incubation at 37° C.* About 3 c.cm. of blood were withdrawn aseptically from the median basilic vein of the left arm, and set aside to clot.

Immediately after the blood was withdrawn the patient was given half an ounce each of castor and sweet almond oils by the mouth, and, if his condition was urgent—as it usually was—a subcutaneous injection of polyvalent serum was administered without waiting for the results of the examination. As soon as the blood had clotted the serum was drawn off and examined macroscopically for its agglutination reactions against B. Shiga and B. Tor.

* At first the blood of each case was examined for micro organisms; as it was invariably found to be sterile, this practice was discontinued.

According to the data furnished by the agglutination reactions and the isolation of dysentery colonies from the stools, the case was treated with polyvalent, Tor, or Shiga antitoxins.

It is to be noted that, while the agglutination test is most valuable as a means towards diagnosis, it is not absolute. It proves the existence, past or present, of infection by the determining germ, when positive; when negative, however, it does not exclude the possibility of present infection. Such negative reactions are seen in two types of cases:

1. The early acute, when there has not elapsed a period since the onset of infection sufficient to admit of agglutinins being formed.
2. Very severe cases, usually in old men, in which the organism is too exhausted to respond to the infection by the production of agglutinins.

This point is mentioned in order to emphasize the necessity of treating all cases with either a polyvalent serum or multiple injections of different monovalent serums. A man may have an attack of dysentery, for instance, due to infection by Bacillus A. At any time during the course of the attack, or during convalescence, an infection by Bacillus B. may be superimposed. If seen a day or two after the onset of the second infection, the blood would give a positive agglutination reaction for Bacillus A. and negative for Bacillus B. The examination of the stools would show Bacillus B. to be present, while in all possibility Bacillus A. would be absent, or, if present, would be missed. In all cases, therefore, an examination of the stools must go hand in hand with the serum reactions in order to arrive at a true diagnosis. *A fortiori* the mere presence of amoebae in the stools, while, in our experience, absolutely diagnostic of the presence of amoebic ulceration, does not exclude the possibility of a coexistent bacillary infection.

Only in those cases, therefore, in which the examinations of the blood and stools were negative, in which the presence of amoebae was determined, and the clinical picture was one of amoebic dysentery, was the serum intentionally withheld.

As regards the quantity of serum to be injected, no hard-and-fast rule can be laid down, as in diphtheria; each case must be judged upon its merits, and the serum pushed until its therapeutic effect is apparent and maintained. In this connexion it may be noted that antidysenteric serum differs from antidiphtheritic serum, in that the former is efficacious in cases of one, two, three, or even more months after the onset of the disease, if given in sufficient quantities.

The patient's general condition, gauged *ab inspectu*, is the best criterion as to the amount of serum to be given; the condition of the stools is not so important.

Our general practice was to give an initial dose of 40 to 60 c.cm. in mild cases, 80 c.cm. in severe cases, and 100 to 120 c.cm. in desperate cases. These doses were repeated as required, as much as 320 c.cm. being given in twenty-four hours.

In one gangrenous case (B. Tor infection), complicated with a severe toxic nephritis and accompanied by general anasarca and subcutaneous ecchymoses, no less than 520 c.cm. of the serum were administered in all. The patient, an elderly Turk, was discharged convalescent after nineteen days' treatment. In other cases a single injection of 80 c.cm. of polyvalent serum was sufficient to effect a cure.

As a general rule 80 c.cm. of polyvalent serum, followed as soon as a diagnosis was made—in cases of single infection—by 80 c.cm. of the specific serum, were administered. The beneficial effect of the serum was manifested, as a rule, in from four to twelve hours after its injection; in all cases the most striking phenomenon was the improvement in the patient's general condition—the pulse became fuller and slower, the heart sounds of better quality, the temperature rose or fell to within normal limits, and abdominal pain disappeared. The effect on the patient's mental condition was no less remarkable, a condition of utter prostration, or groaning hopeless despondency, being replaced by one of cheerful comfort, accompanied by insistent demands for food and tobacco.

With this striking change in the general condition there was usually no corresponding improvement in the character of the stools, which were often more abundant and fetid, and contained more sloughs than before, though the number passed was usually diminished. This curious combination of general euphoria with gangrenous stools sometimes persisted for three or four days, occasionally even longer, and would then be replaced by complete constipation of twenty-four hours' duration. A small dose of castor and almond oils would then bring away an abundant normal pultaceous stool.

In the early acute cases, on the other hand, the effect would often be immediate, a short period of repose being followed by the passage of abundant faeculent, pultaceous stools.

Untoward Effects of the Serum.

In spite of the large quantities of serum used these were of rare occurrence and of trifling importance. In only one case was anything approaching a serum rash observed. This was the case of an old man who died of gangrenous amoebic, not bacillary, dysentery, and who exhibited a few ephemeral urticarial rings around the site of the injection some few hours after the first dose of serum was given. Fairly frequently a rise of temperature was observed, usually about six hours after the first injection; it was usually insignificant, but in two acute cases the thermometer registered nearly 41° C., and there was a good deal of headache, restlessness, and general pain, particularly affecting the back and joints, and recalling that seen in dengue. These rises of temperature never lasted more than twelve hours, and were not observed after subsequent injections of serum in the same individual. They required no special treatment, and antipyretics were never given.

No late or remote effects were observed. No cases of sepsis were ever seen, nor did the sites of injection, even after 60 c.cm. had been given through one needle, remain painful or tender for more than a few minutes. The serum was always given injected deeply into the subcutaneous tissues of the flank and abdomen, and was so quickly absorbed that it was never considered necessary to give it intravenously.

Amoebic Cases.

These were treated upon the orthodox lines recommended in all textbooks, with the addition that the "enema Kartulis"* was given night and morning as a routine in most cases. It was of undoubted benefit in the "early" acute cases, but no value at all in the old chronic or gangrenous cases. With the idea that it might be of value during its absorption, pararosaniline acetate in 0.5 per cent. solution was tried as an enema; the effect was disappointing, and in no case was it absorbed sufficiently to tinge the urine.

The evidence that the serum is specific for bacillary cases is furnished by the mortality rate of 91.6 per cent. in the 13 purely amoebic cases in which it was tried. The high mortality rate of the amoebic cases, and of the bacillary cases before the introduction of the serum treatment, calls for a word of explanation. It may be stated at once that this is to be sought in factors affecting the patient and the disease, rather than in the treatment previously adopted. Practically all the orthodox methods of treatment by drugs, enemata and diet, had been tried by many different physicians of different schools and nationalities: ipecacuanha, calomel, the sulphates, castor oil, El-Kosam, simaruba; astringents, such as opium, bismuth, tannic acid and tannoform, tannalbin, tannagen; antiseptics, such as salol, beta and benzo-naphthol, etc., all were found wanting in that they failed to counteract the toxinaemia and microbic activity, to which the patient succumbed. Further, the patients whom we were called upon to treat were nearly all very old men, exhausted by famine, fatigue, and the hardships attendant upon desert travel in Arabia. As a result, by the time a case was admitted to hospital, the infection, aggravated by the lack of rest or any other treatment, and acting upon frames often already weakened by previous cardiac and renal disease, had reduced the patient to a state of utter *misère physiologique*, so that his condition could only be described as desperate.

REFERENCES.

[1] Ruffer and Willmore, BRITISH MEDICAL JOURNAL, September 25th, 1909. [2] Dopter, *Annales de l'Institut Pasteur*, Tome xxiv, No. 2, Février, 1910. [3] Shiga, Osler and McCrae's *System of Medicine*, vol. ii, p. 798. [4] Ruffer and Willmore, loc. cit. [5] Todd, *Journal of Hygiene*, vol. iv, No. 4, October, 1904, and references quoted therein. [6] Todd, loc. cit.

* So called because the formula—that of a Dutch army surgeon in the East India Islands—was kindly communicated to us by Dr. Kartulis. It consists essentially of an emulsion of iodoform and tannic acid.

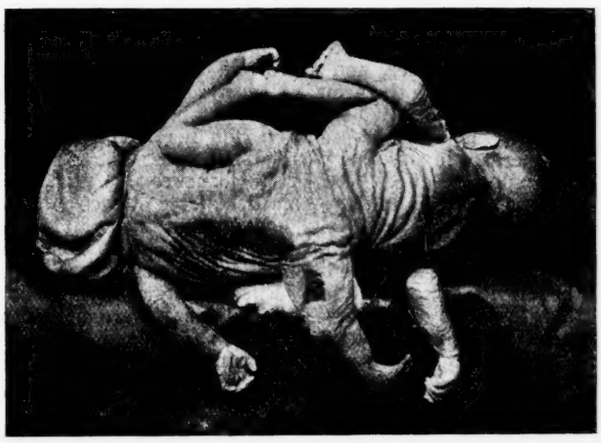
Memoranda:

MEDICAL, SURGICAL, OBSTETRICAL.

A CASE OF SIAMESE TWINS.

Dr. Carmichael and Surgeon R. M. Riggall, R.N., have recently recorded in the Journal cases of Siamese twins, but they have both been produced abroad, whereas this case may be of interest in that it is one of home production, being born last March at Lowestoft, in the county of Suffolk; the mother being a young English woman, aged 21.

The birth of the specimen was not extremely difficult. The head of the smaller child presented in the left occipital anterior position, but did not come down at first, although forceps easily delivered it. On traction being made one was able to diagnose the condition by tearing



the two children apart. Once the breach of the first child was delivered the second child followed quite easily. The two children were seen to be alive during the labour, but expired before birth was complete.

The weight of the specimen is 6¾ lb. The mother states she had been pregnant almost nine months.

The specimen consists of two small children, which were joined together from their nipples downwards. One child showed a condition of hydrops cranii, otherwise they appeared to be perfectly formed above the diaphragm, each having perfectly formed upper extremities. There was a single placenta, with a single cord attached to the monster. Each child has one fully formed leg, but beside these there is one fin-shaped appendage, which appears to be two legs fused into one, making three lower extremities in all. There is one cloacal aperture, consisting of an upper portion which is apparently connected with a single bipartite uterus inside, with fully formed Fallopian tubes and ovaries, whilst the lower portion is apparently connected with a single rectum. There is also what appears to be an attempt at the formation of two more ovaries and tubes further behind on the back wall.

Each child has a fully formed stomach and duodenum, lying below two separate livers, which were fused in the middle line and are torn apart. Above the liver is a separate diaphragm in each case. Each child has separate large and small intestines, with a caecum, and one well formed appendix; they join into a common rectum, which leads to a common anus, which is imperforate, the bowel being distended above. The four kidneys are separate, with four separate ureters, which all lead down to the space in front of the uterus and end blindly. There is no formed bladder, but at the upper end of the cloaca there is a small fungating mass, which looks somewhat like an extroversion of the bladder. Each child has a well formed spleen, but in the case of the child with the deformed head it is on the right side of the body. The organs within the thorax seem normal, except that the child with the deformed head has an enlarged heart, with no ventricular septum. The thymus gland in both children is large.

Lowestoft. Dudley W. Boswell, M.D., M.B., Ch.B.

TETANY FOLLOWING AN ACCIDENTAL OVERDOSE OF THYROID EXTRACT.

Tetany has developed within two to five days after parathyroidectomy. In some cases tetany has been noticed some months after operations in the vicinity of the parathyroid glands. These observations have led some to attribute tetany to some functional defect in the parathyroids, either congenital or acquired.

Forsyth[1] believes that the thyroids and parathyroids are functionally the same, that the former produce active secretion of colloid indistinguishable from thyroid colloid. Further, the suggestion has been made of trying thyroid extract in cases of tetany, on the supposition that hypothyrea may exist.

The following case, therefore, cannot fail to be of unusual interest:

A little girl, $3\frac{2}{12}$ years of age, was discovered in December, 1909, in a house where I was in attendance upon the mother during her confinement. She presented very definite if not very marked stigmata of cretinism. She was a fat, plump child, with reddish, somewhat cyanotic cheeks, abundant coarse hair covered her head. The anterior fontanelle was not closed. Her hands and feet were cold and blue. She had prominent supraorbital ridges; her eyebrows were scanty. Her abdomen was protuberant, but there was no umbilical hernia. She had well marked lordosis, and her tibiae were curved. She was short in stature, and unable to say more than two or three words. Mentally, as well as physically, she was certainly deficient and backward. The rectal temperature was 95° F. I prescribed thyroid extract, 1 grain t.i.d. (Burroughs Wellcome and Co.), and gradually increased the dose to 2½ grains t.i.d. All went well for a month, during which time she became more active and very mischievous. One morning she climbed on to a chair, secured the box containing only five tablets of each 5 grains of the extract from the mantlepiece, and swallowed the whole. She "cried and screamed" a great deal that day. Six hours after she became "stiff and convulsed." A dose of castor oil was given, and later some bromide. There was no diarrhoea. I saw her the next day; she was stiff, and presented very pronounced signs of tetany. Her eyes and limbs "twitched" a good deal. Her face was very red. The characteristic accoucheur's hand and arched feet were quite typical. The fingers and wrists were swollen, and moving the joints made the child cry. The whole of each limb and the back were stiff and painful. The deep reflexes were increased. The pulse was very quick, and the child was feverish.

She was unable to stand or sit without support. The treatment was suspended for a fortnight, and the symptoms gradually disappeared. At the end of that time ¼ grain of thyroid extract was given t.i.d., increased to ½ grain. During the week after resuming the "accoucheur hand" was again noticed. The dose was again reduced but later increased. One month later a slight recurrence of the "accoucheur hand" compelled me to reduce the thyroid, and since then, though on continuous treatment, no recurrence of the tetany has been observed.

The first attack might well be ascribed to gastro-enteric irritation following the ingestion of the tabloids, but the slight occurrence on the two subsequent occasions incline me to the view that the tetany in this case at least was

[1] British Medical Journal, 1907, vol. ii, p. 1508.

due to hyperthyroidea. In animals the calcium output is increased in the urine after thyroid feeding, and the blood contains only half the normal amount. I think it is now well established that the thyroid has a material influence upon the calcium metabolism of the body, the influence being largely an excretory influence. If this be so, have we not here an explanation of the tetany in the above case?

London, N.W. G. W. R. SKENE, M.B., Ch.B.Edin.

Reports

ON

MEDICAL AND SURGICAL PRACTICE IN THE HOSPITALS AND ASYLUMS OF THE BRITISH EMPIRE.

MANCHESTER EAR HOSPITAL.

CASE OF CHRONIC SUPPURATIVE OTITIS MEDIA WITH LABYRINTHINE FISTULA AND SPONTANEOUS NYSTAGMUS.

(By LINDLEY SEWELL, M.B., B.S., M.R.C.S., etc., Assistant Surgeon.)

A WOMAN, aged 24 years, was admitted to hospital on August 4th, 1910, complaining of severe headache and dizziness of about four months' duration. She stated that the right ear had discharged since infancy. On examination a perforation, through which protruded a small polypus, was seen in the postero-superior quadrant of the right tympanic membrane. The pus in the meatus was very foul and mixed with desquamated epithelium. The patient had an unsteady gait, stumbling to the right side, also on standing erect with feet together and eyes closed she showed a tendency to fall to the right; she was unable to stand on one foot with eyes closed. She had slight, although well-marked, spontaneous nystagmus directed to the left, most marked on deviation of the eyes to the left and disappearing on their deviating to the right side. On syringing out the right ear with cold water the nystagmus to the left was much increased in intensity. By compression of the air in the meatus by means of a small Politzer's bag fitted to it, a strong nystagmus directed to the right side was produced; by rarefaction the nystagmus to the left was increased.

The acoumeter was heard on the right side at a distance of 8 in., and using tuning-fork C 256, bone conduction was increased by 5 seconds, and Rinne's test negative; and by air conduction C 64 was not heard, C 256 was diminished by 24 seconds and C 2048 by 14 seconds. Galton's whistle was unfortunately not used. There was no optic neuritis and no squint. A diagnosis of labyrinthine fistula secondary to suppurative otitis media was made, and a radical mastoid exenteration performed. Extensive destruction of bone was found accompanied by a foul-smelling cholesteatoma, and in the region of the external horizontal canal was a small erosion through which a probe could be passed. The fistula was not curetted or enlarged. The patient made an uninterrupted recovery, the unsteadiness and headache quite disappeared, and at the end of a month's time there was no nystagmus present.

REMARKS.—The case is of interest in that it illustrates the value of Bárány's vestibular tests as an aid to diagnosis in certain cases. The well-marked response to syringing with cold water indicated that the vestibular apparatus was still active, and that therefore no gross lesion of the labyrinth was present. The nystagmus induced by condensation and rarefaction of the air in the auditory meatus pointed to some breach in the labyrinth; this reaction may indeed be regarded as almost certain evidence of a labyrinthine fistula, although rare exceptions have been reported. The correct treatment of such a condition consists in performing a wide radical mastoid operation, keeping the case under careful observation, and only interfering with the labyrinth should rapid recovery not ensue.

Reports of Societies.

ROYAL SOCIETY OF MEDICINE.

CLINICAL SECTION.

Friday, October 14th, 1910.

Sir A. PEARCE GOULD, President, in the Chair.

Adiposis Dolorosa.

THE following were among the exhibits:—Mr. ALBERT CARLESS: A case of possible adiposis dolorosa in a woman always anaemic and of poor circulation. From time to time she had noticed that the tissues beneath her chin became somewhat swollen. In March last she had a small fatty growth in the back of the neck in the sub-occipital region, but it caused her no pain. Between the months of April and June a marked fatty development occurred, affecting mainly the shoulders, the back of the neck, the root of the neck, the back, and the front of the abdomen. Those diffuse fatty masses had been decidedly painful and tender, and there had been some degree of neuralgic pain in the arms. The thyroid body appeared to be atrophied. She had taken thyroid tabloids and pituitary extract. The former seemed to do her good and control the increase in size, but worried her eyes somewhat; the latter had no effect. Dr. H. D. ROLLESTON: A man, aged 45, who showed almost symmetrical fatty masses over the neck, shoulders, arms, the lower abdomen, sacral region, and the upper and inner aspects of the thighs. The veins over the chest and the lipomata in the neighbourhood of the clavicles were dilated. Except in one or two spots there was no tenderness; the tumours were not spontaneously painful, and there had not been any local pain before the appearance of the tumours. The condition, therefore, was not adiposis dolorosa nor Dercum's syndrome. It approached but did not accurately correspond with Lyon's group of "Diffuse symmetrical lipomatosis, with predilection for the neck." Dr. ALFRED M. GOSSAGE: A case of possible adiposis dolorosa in a woman, aged 54, who had always suffered from pains in the legs. From the age of 44 she had become very stout, and the legs had become much more painful. There were numerous fatty swellings on the legs and thigh, which were painful and tender.

OTOLOGICAL SECTION.

Friday, October 21st, 1910.

Mr. ARTHUR CHEATLE, F.R.C.S., President, in the Chair.

THE PRESIDENT opened a discussion on *Syphilis in relation to otology*. Speaking of the congenital cases, he said he had generally found the usual antisyphilitic remedies useless. Blisters applied to the mastoid were, on the other hand, of much benefit. In dealing with cases of middle ear deafness in acquired syphilis, the naso-pharynx should be searched for gummata. Exact localization of the seat of a lesion when the perceptive portion of the ear was involved was difficult owing to the absence of *post-mortem* knowledge of such cases. Dr. URBAN PRITCHARD agreed that in congenital syphilis the age of the onset of ear troubles was not always a fixed one. He had seen cases which came on quite late in life. In acquired syphilis he had been struck with the infrequency of Eustachian deafness in syphilitic pharyngitis. Mr. WEST asked if there was any definite proof in the late cases of labyrinthine trouble of the patient being syphilitic, or even if in cases in which the patient had been syphilitic as a child was it certain that the deafness was due to syphilis? In regard to condylomata he had been struck with the intense pain the patients suffered. Mr. A. L. WHITEHEAD did not think that ulceration of the nose and naso-pharynx was infrequent in congenital conditions Condylomata in the acquired syphilis, although intractable, healed as a rule without causing contraction. Mr. MACLEOD YEARSLEY was not of opinion that syphilis was never the cause of deaf-mutism. Bardeau, in his researches upon stillborn children who were syphilitic, found the middle and internal ear involved. Dr. DAN M'KENZIE agreed with Mr. Yearsley on this point, and quoted in support a paper which had appeared in the archives of a German society. Mr. MCDONAGH said that he had treated only one case of ear trouble with "606." That was an acquired case in

which the patient had a lesion of the ninth nerve on one side. Hearing was certainly improved after the injection. Mr. WAGGETT said it was important to examine the post-nasal space in patients who had otalgia with syphilis. The PRESIDENT replied.

EDINBURGH MEDICO-CHIRURGICAL SOCIETY.

Wednesday, November 2nd, 1910.

Dr. BYROM BRAMWELL, President, in the Chair.

Epithelioma of the Tongue.

PROFESSOR CAIRD reviewed 60 hospital cases of epithelioma of the tongue. In 38 of them there was a history of antecedent irritation, the cause of it in 27 cases being the state of the teeth. No case had been preceded by leucoplakia. Only in 4 cases had a negative microscopical examination been falsified by the result. He preferred a two stage operation, removal of the tongue under local anaesthesia, followed a few days later by a Butlin operation on the lymphatic structures in the neck. Unless the jaw were diseased he did not interfere with it. It was not possible, he thought, to base prognosis on the histology of the glands removed. Of the 60 cases only 16 now survived, not including 8 which could not be traced. But in some of the earlier cases the tongue only had been attacked. Though the results were disappointing the operation was perfectly justified, as it relieved the patient from the terrible pain and discomfort of fungating cancer in the mouth; recurrence of the disease in the tongue was happily rare.

Recurrent Enlargement of the Salivary Glands.

Mr. GREIG gave an account of five cases of recurrent enlargement of the salivary glands. Of these, three were submaxillary and two parotid. Common features were the tendency to recurrence, and the sudden enlargement of the gland during eating. In the parotid form there was usually some constitutional disturbance, but this was absent in the submaxillary. Again, in the parotid, while at first single, it tended later to affect both glands. In his cases it remained single in the submaxillary. The condition must be diagnosed from mumps, where the occurrence of that disease in the district and the fact of contagion must be obtained; from Mikulicz's disease, where there was parotid enlargement, but no recurrence; and from sialodochitis fibrinosa, where there was no constitutional disturbance and there was rapid subsidence with a free salivary flow.

Fungus Infections of the Finger-nails.

Dr. CRANSTON LOW gave an account of 19 cases of this condition. Of these, 16 were cases of ringworm, all the patients but 2 being females. A history of infection from ringworm elsewhere on the body was rare. The duration of disease was from three weeks to seven years, and the number of nails affected 1 to 7. The toenails were never affected. The disease caused splintering of the end of the nail, with zones of yellow and brown above this. The nail might be irregular and heaped up, showing an affection of the nail bed. The diagnosis was by microscopic examination of fragments after prolonged immersion in caustic potash. In all his cases the large-spored fungus was present. In a number he had cultivated the fungus in Sabouraud's proof-medium, and had obtained growth of two different forms—the *Trichophyton crateriforme flavum* and the *Trichophyton rosaceum*. The best treatment was that devised by Dr. Norman Walker—the softening and removal of the nail by prolonged application of Fehling's copper solution, followed by the use of a dressing soaked in copper sulphate solution, 10 grains per ounce.

Exhibits.

The cases demonstrated included the following:—Mr. COTTERILL and Dr. BRUCE: A patient in whom, following an attack of post-basic meningitis in 1908, there had developed *Hydrocephalus* associated with marked stupor, complete blindness extreme weakness of both legs, and recurrent loss of control of bladder and rectum. By operation the foramen of Majendie, which was closed by fibrous tissue, was reopened, the result being practially complete recovery of intelligence, sight, motor power, and control of reflexes. Mr. MILES: A patient who had suffered from right *Trigeminal neuralgia* for five years, and in whom the removal of the Gasserian ganglion with the second and third divisions of the fifth nerve had resulted in immediate and, so far, permanent relief of the pain. Dr. BOYD: A patient with *Cerebro-spinal meningitis*, and with purulent spinal fluid, which was sterile on cultivation. A positive von Pirquet reaction suggested that the condition was possibly tuberculous, but repeated lumbar puncture with intraspinal injections of 1 per cent. collargol resulted in complete recovery.

SHEFFIELD MEDICO-CHIRURGICAL SOCIETY.

Thursday, October 27th, 1910.

Mr. A. CUFF, President, in the Chair.

Squint.

MR. G. H. POOLEY, in a paper on squint, pointed out that when the fusion sense was weak, errors of refraction such as hypermetropia produced over-accommodation for near objects, and, owing to the close relation between the centres in the brain for accommodation and convergence, over-convergency was produced. The fusion sense not being strong enough, diplopia did not cause much trouble, and the brain learnt to disregard the impression from one eye. The causes of loss of fusion sense were not known, but were supposed to be associated, in some cases at any rate, with defects of the auditory apparatus or the labyrinth, and allied to nystagmus; or to be simply due to developmental error in those association bundles which are late in receiving their myeline sheaths, or in the centres which they join up. It was necessary to undo the mischief step by step—first, to correct the error of refraction, then to occlude or atropinize the fixing eye until the power of fixation returned to the squinting eye. In cases he had investigated 75 per cent. of the squinting eyes were amblyopic; and in cases it was advisable to occlude or atropinize the fixing eye for twelve to eighteen months, or until good sight had returned to the amblyopic eye. If these had not already become straight, then operative measures might be successfully employed.

Exhibits.

The following were among the exhibits:—Dr. A. G. YATES: Miner, aged 41, with *Chorea*. In July, 1910, he began to suffer from a sharp stinging pain in the right shoulder. Shortly afterwards he noticed irregular movements in the hands which later spread upwards and involved the arms and head. He has now slight lateral nystagmus and constant pain above the right clavicle in the region of the brachial plexus. The knee-jerks are slightly exaggerated. In other respects he appears to be healthy. His sister has suffered in the same way for the last twenty years. Mr. W. S. KERR: A specimen from a case of innominate aneurysm causing *Asphyxia from tracheal pressure*. The patient, a man aged 34, who had had syphilis, was admitted to the Royal Infirmary for urgent dyspnoea. A laryngotomy and passage of a small catheter gave temporary relief. The trachea was flattened by the tumour. Mr. R. FAVELL: A specimen from a case of Caesarean section for *Accidental haemorrhage*. Mr. A. E. BARNES: A *Tumour of the pons*, the nature of which has not yet been determined.

LEEDS AND WEST RIDING MEDICO-CHIRURGICAL SOCIETY.

Friday, October 28th, 1910.

Dr. CHRISTY WILSON, President, in the Chair.

Béraneck's Tuberculin.

THE PRESIDENT, in the course of an opening address on tuberculosis, stated that of the various tests for tubercle, he found von Pirquet's more accurate and safer than Calmette's, but regarded the subcutaneous method as being the most accurate. In making his tests he preferred Béraneck's T.B.K1 tuberculin. The same product was also much preferable to Koch's new tuberculin, and if it were more widely employed, tuberculin treatment would gain in popularity. He quoted illustrative cases of improvement that had followed its use. It was not necessary, he thought, to control injections by the estimation of the opsonic index.

Exhibits.

The following were included among the exhibits:—Mr. H. COLLINSON: A specimen of *Traumatic rupture of the spleen* successfully treated by splenectomy. The patient, a labourer, was kicked by a horse over the left costal margin; this was followed by haematuria and signs of intra-abdominal haemorrhage. At the operation, a large retroperitoneal haemorrhage was present over the left kidney. Dr. R BEATTIE: A mass of hair removed from the stomach of a girl, and which formed an exact cast of the organ; it weighed 2½ lb. Before the operation a hard gastric tumour was made out. Mr. MICHAEL TEALE: A child who sustained slight concussion of the brain. This was followed by swelling of the nasal half of each optic disc and marked rotatory nystagmus of a temporary nature. Mr. H. LITTLEWOOD: A small spirit level and a pencil case successfully removed from adult male bladders. Mr. C. H. GREENWOOD: A liver from a case of portal cirrhosis in a child who had been treated by *Fibrolysin*. Microscopic appearances showed that softening of the fibrous tissue was taking place.

NOTTINGHAM MEDICO-CHIRURGICAL SOCIETY.

Wednesday, October 19th, 1910.

Mr. W. MORLEY WILLIS, President, in the Chair.

PROFESSOR ALEXIS THOMSON of Edinburgh, in an address before the society, recorded and illustrated the ideas of Poncet of Lyons. The latter regarded all lesions to which some other definite pathological cause was not assignable as being due to tuberculous intoxication, even if by no clinical or pathological process could the presence of tuberculous disease be demonstrated. Eburnation of the articular surfaces had hitherto been regarded as typical of osteo-arthritis, but the speaker showed a bone with ivory eburnation surrounded by caries typical of tuberculous disease. Bony ankylosis had usually been regarded as due to suppuration, yet he showed a specimen clearly of a tuberculous nature. Two specimens of bony ankylosis of the vertebral column were hard to explain except on a tuberculous hypothesis. Cases which would be labelled multiple osteo-arthritis or rheumatic arthritis commonly ended in phthisis and the association of undoubted tuberculous disease of one joint with polyarthritis of the finger was also common. As for clinical manifestations, since cases of "growing pains" invariably recovered, it was commonly assumed that they could not be tuberculous; but Poncet maintained that they were cases of an attenuated tuberculous toxin. He carried his theory beyond joints. From analogy with the synovial membrane he considered adherent pericardium, dry pleurisy, hydrocele, and meningitis to be generally tuberculous. To the same origin he assigned the cause of aortitis, phlebitis, and endocarditis. Even neuralgia, ocular lesions, thickening of the pylorus, and colitis, Poncet assigned to this cause, and declared these cases did better on an anti-tuberculous treatment than on the usual spa treatment. Although it was difficult to agree with all Poncet's theories, the speaker thought they afforded ground for recasting some views of these lesions in practice.

HARVEIAN SOCIETY OF LONDON.

Thursday, October 27th, 1910.

Dr. HANDFIELD JONES, President, in the Chair.

Cystic Disease of the Breast.

MR. D'ARCY POWER, in opening a discussion on the diagnosis and treatment of cystic disease of the breast, stated that classification of cystic disease in this region was at present chaotic, and offered a scheme of his own for consideration. In the course of his remarks he stated that single and simple cysts were sometimes placed so deeply or had such thick walls as to be mistaken for solid tumours, and every pathological museum contained specimens from cases in which the entire breast had been removed under misapprehension of the existence of cancer. It should, therefore, be a cardinal rule to incise every breast before performance of amputation. Incision was always preferable to puncture, because, apart from other considerations, mere puncture might lead to intracystic growths being overlooked. Mr. E. H. SHAW, who also suggested a classification, did not believe that there was such a condition as lymphatic cyst of the mammary gland. For the tumours known as "duct" papillomata he preferred the term "intracystic papilloma." Mr. W. G. SPENCER remarked that only in few cases did the contents of "serous" cysts correspond to blood serum. He recalled that Kanthack had regarded papillomata as connective tissue tumours. This view had been regarded by many as heretical, but was supported by the fact that many intracystic growths were chiefly composed of connective tissue stroma. Cases of recurrent mastitis should be excised if they did not yield to treatment after a few months. Circumscribed cysts should not be shelled out, but be removed together with a zone of healthy breast tissue. If the surrounding zone were not apparently healthy he would excise the breast, leaving the nipple. Mr. T. CRISP ENGLISH regarded mammary cysts as almost always secondary to mastitis or other local disease. Recognition of the primary condition being of essential importance, an exploratory incision should always be made. The ordinary form of cystic mastitis did not, he considered, involve any special predisposition to malignant disease. Mr. GASK thought that intracystic growths were always due to protrusion of stroma or interstitial tissue into the cavity of the cyst, and were not epithelial. This stroma might be fibrous tissue alone, or fibrous tissue showing myxomatous or sarcomatous degeneration. Hence the confusion as to the meaning of Brodie's disease. As for mastitis with cyst formation, the whole breast should be removed if surgical treatment were needed. Partial excisions did not free the patient from neuralgic pain, and in certain cases carcinoma followed. Mr. CLAYTON GREENE agreed as to the propriety of removing a zone of healthy tissue at the same time as the cysts.

Reviews.

MEDICAL INSPECTION OF SCHOOLS.

THE literature of the medical inspection of schools is already of considerable dimensions and still grows, although many of the publications do not differ much in their contents. Dr. KELYNACK has, however, given us an exceedingly useful collection of articles,[1] most of them by writers having practical experience in their subject, and the series covering almost the entire field as at present opened up. It is, of course, impossible that any existing staff of school medical officers could undertake anything like the amount of work suggested by the writers of the various articles, some of whom are apt to forget that there are other branches of medicine in addition to their own special choice. The system of covering the ground by means of a number of writers has, however, certain advantages, and in his choice of authorities Dr. Kelynack has made good these merits. The sections on organization and administration will be specially interesting to the school medical officer. Secondary schools are also dealt with, although in these as yet inspection is not legally compulsory. The sections on eyes and eyesight, the ears, nose, throat, and dental conditions, are all well written and contain much valuable information; that on mentally defective children is excellent and all too short. Section 14 gives a good description of the Bradford school clinic, and Section 15 is a very useful article on the feeding of school children. Open-air schools and the school nurse are other subjects ably dealt with, and containing much information and many hints for those whose authorities are progressive enough to provide them. The descriptions of the medical examination of schools and scholars in Scotland, in America, and on the Continent are good reading, as showing the differences in develop-

[1] *The Medical Examination of Schools and Scholars.* Edited by T. N. Kelynack, M.D. London: King and Son. (Demy 8vo, pp. 450. 10s. 6d.)

ment and the comforting fact that even in Germany things are far from perfect. The article on Ireland paints a sad picture, while that on Wales, with its bibliography, is a curious production. The bibliography is exceedingly good, and is arranged so as to follow each section. There is remarkably little overlapping of sections, and the book forms an excellent guide and provides an ideal model for those responsible for the carrying out of medical inspection of schools.

MALFORMATIONS AND VARIATIONS.

In a pamphlet of thirty-three pages Professor Ernst Schwalbe of Rostock discusses the relationship between malformations and variations,[2] with a view to finding, if possible, what connexion there may be between malformation and the formation of species, and what investigators into these two subjects can teach one another so as to throw new light upon both. This inquiry divides itself into two parts—a discussion of variations or varieties as an expression of variability, and the question of whether varieties and malformations can be referred to the same cause or principle of development. To measure and define the range of variations of any given organ within the normal is difficult in the simplest cases, and the difficulty increases when we pass from a morphological to a physiological point of view. Moreover, although form and function are not unconnected, physiological variations may occur without morphological variations, and vice versa. The author uses the term "variety" for the alteration (*Abänderung*) of the whole individual within the species, and "variation" for the varying of a single organic part of the individual. "Malformation is a change of form (or of position, size, or number) of one or more organs or organic systems of the whole body occurring during fetal development, and so congenital, which goes beyond the range of variation of the species." From this quotation it will be seen that to distinguish between variations and malformations it will be necessary to define the range of variation. Dr. Schwalbe goes on to show that it is not generally possible to do so. For, although in many cases no one would hesitate to decide whether the abnormality in question is a malformation or only a variation, in many others it is impossible to draw the distinction. Dr. Schwalbe's previous work on the subject of malformations and monstrosities would lead us to expect that the essay would contain, as it does, much matter for reflection, and we can recommend it as containing many suggestive examples and disquisitions upon them. This pamphlet is the ninth of a series of monographs on anatomical and physiological subjects published under the editorship of Dr. E. Gaupp and Dr. W. Nagel.

SPECIAL SURGERY.

The *Grundriss und Atlas der Speziellen Chirurgie*[3] of Professor Sultan is a very portable publication, and the diagrams and drawings of the stages of operations, though small, are clear. The last volume includes the general technique of laparotomy, the surgery of the abdominal parietes, omentum, mesentery, stomach, intestines, liver, pancreas, spleen, kidneys and ureters, bladder, male organs, pelvis, hernia, and, lastly, the upper and lower extremities. The author introduces good illustrations, instructing the reader about matters concerning surgical anatomy not included in elementary textbooks, such as the bursae associated with muscles and tendons in the region of the shoulder and popliteal space. The coloured drawings demonstrating the morbid anatomy of the abdominal viscera, cholelithiasis, renal calculus, and the diseased bladder, as seen through the cystoscope, are likewise satisfactory, but the strong point of the publication as an atlas is the clinical department. The photogravures of deformities, etc., are good, as is usually the case in works published at the present time, when the authors can enjoy the useful resources of modern art, but the coloured engravings taken from life are of unusually high quality, even for the best contemporary medical works. They recall the fine drawings in atlases by authorities like Sir Jonathan Hutchinson. We may give an honourable mention to the plates representing cases of lymphangioma, ectopia vesicae in both sexes, haemorrhoids, and prolapsus ani. They are really instructive and not merely elegant representations of ugly diseases. The young surgeon and the experienced but elderly operator who alike seek instruction in new methods will, we suspect, make use of the volume mainly for its directions and diagrams under the heading "Technique of operations on the stomach and intestines." Dr. Sultan admits that Murphy's button is of value on account of the simplicity of its application, but warns his readers that it may in itself be the cause of bad complications.

MEDICAL AND SURGICAL HANDICRAFT.

Dr. Julius Schwalbe's handbook of therapeutic technique,[4] of which the first half volume was reviewed in our pages two years ago (British Medical Journal, 1908, vol. i, p. 999, April 27th), has already reached a second edition. The almost infinite variety of means of treatment at the disposal of the modern practitioner is such that even in this book of nearly one thousand closely printed pages some things must be omitted and some almost too briefly touched upon. On the other hand, too much importance is perhaps given to some details. For instance, two illustrations are devoted to the removal of an artificial eye. Certain sections of the work are rewritten in this second edition. Owing to the deaths of Professors Hoffa and Vierordt, the sections on hydrotherapeutics and thermotherapeutics, massage, gymnastics, and mechanical orthopaedics are now presented by Professors Rieder and Riedinger, and, instead of Professor Englisch, Professor O. Zuckerkandl has written the section on kidneys and the male reproductive organs. There are entirely new sections on the therapeutics of nutrition and diet by Professors F. Kraus and Privat-Docent Brugsch, and on the technique of the treatment of venereal and skin diseases by Professor Bettmann. There are 153 more pages and 72 more illustrations in this than there were in the first edition; the print and paper are good, and—what is most important in a work of this kind—there is a good index. It should prove a useful book of reference.

HOME NURSING.

Miss Isabel MacDonald's position in the nursing world is sufficient guarantee for the accuracy and reliability of any work from her pen on her own subject, and in the preface to *Home Nursing*[5] she suggests that she is about to do something which would be of inestimable value. That is to provide a sort of handy guide to mothers of families or to women in the position of mothers, which should tell them what to do when there was illness in the house. Such a book should be quite different from the ordinary manual of nursing, which is addressed to those who are learning the art of nursing as a profession. Unfortunately Miss MacDonald seems to have lost sight of this distinction, and her little book differs hardly at all from the dozens of excellent nursing handbooks already on the market. What mother faced with a child screaming from a tumble is going to read through directions as to first aid in case of various fractures which she is utterly incompetent to diagnose? She will send for the doctor without consulting a book to tell her to do so, and the child will not be much the worse for the lack of the extemporized splints. But as long as Miss MacDonald

[2] *Sammlung anatomischer und physiologischer Vorträge und Aufsätze.* Herausgegeben von Prof. Dr. E. Gaupp and Prof. Dr. W. Nagel. Heft 9. *Missbildung und Variationslehre.* Von Ernst Schwalbe in Rostock. Jena: Gustav Fischer. 1910. (Roy. 8vo, pp. 33, 7 text figs. Pf 80.)

[3] *Grundriss und Atlas der Speziellen Chirurgie.* Von Professor Georg Sultan. II Teil. Vol. xxxvii of Lehmann's *Medizin Handatlanten.* Munich: J. F. Lehmann. 1910. (Cr. 8vo, pp. 630; 40 Tafeln, und 261 zum Teil zwei-bis dreifarbigen Abbildungen nach Originalen von Maler: Schmitson, Berlin. M. 16.)

[4] *Therapeutische Technik für die ärztliche Praxis.* Ein Handbuch für Ärzte und Studierende. By Twenty Authors. Edited by Dr. Julius Schwalbe. Second, improved and enlarged edition. Leipzig: Georg Thieme. 1910. (Sup. roy. 8vo, pp. 995; 557 illustrations. M. 22.)

[5] *Home Nursing; with Notes on the Preservation of Health.* By Isabel MacDonald. London: Macmillan and Co. 1909. (Cr. 8vo, pp. 341. 2s. 6d.

confines herself to the things for which the untrained mother, sister, cousin, or aunt ought properly to be responsible she is admirable. The only fault of the book is that it contains far too much. Again, it is said to be designed mainly as a book of reference, yet it is not provided with an index. There is a very wise and useful chapter on the care of infants, and the chapter on cooking for invalids is particularly useful, and contains many simple, practical recipes which we do not remember to have seen elsewhere.

FOOD.

ON the appearance of the first edition (see BRITISH MEDICAL JOURNAL, October 16th, 1909, p. 1160) we drew attention to the extremely useful Food Tables published by Drs. SCHALL and HEISLER, and we are not surprised that the success of the book has been sufficiently great to enable the authors to publish an enlarged edition.[6] As they say in their introduction, this information can be found in various books, and the only merit they claim is of collecting and putting it together in a convenient form, so that it can be found without trouble. They do not profess to have made original analyses for these tables, and this is for the most part of no moment, but in the present edition they have included a number of meat extracts and invalid and diabetic foods, trade articles which are much advertised, and where the analyses published by vendors are at least open to the suspicion that they may not correctly represent the composition of the articles as they are to be found in the market. It is of importance to know the source from which these figures were taken, and the only independent analyses appear to be those published by Dr. A. Magnus-Levy in the *Berliner klinische Wochenschrift*, No. 6, 1910, on the diabetic breads and biscuits of commerce. The authors refer to the important question of waste; it is obvious that in the case of many foods, particularly poultry, fish, and shellfish, a considerable portion is not eaten, and they suggest that where perfect accuracy is required the contents of the plate should be weighed before and after the meal, the difference only being reckoned as the food consumed.

When we reviewed the first edition of Dr. TIBBLES'S *Food and Hygiene* we spoke favourably of it, although its teaching was in some points antiquated and it contained many small mistakes. A second edition[7] has afforded Dr. Tibbles an opportunity to revise his book and to correct these mistakes, but he has not done so. So far as we can see, this is a reprint of the old book, with nothing altered, amended, or added, except in the appendix, where there is an account of the sour milk treatment. Moltke is still a *Russian* (!) general, Cornaro continues to figure in the plural as "Cornari," Van Ermenghen is hardly recognizable as "Ermenglin"; beri-beri is attributed to diseased rice, and pellagra to diseased maize, without a hint that these doctrines have been called seriously into question during the last few years, and so on. On page 81 he gives what he says is the daily ration of French soldiers; we have compared this with the dietary of the French army given in Marcelle Labbé's *Régimes Alimentaires* (1910), and in scarcely a single instance do the items correspond, doubtless because Dr. Tibbles has not taken the trouble to find out what the French soldier gets at present, but has reprinted something which was true some time ago. We spoke of his book in our former notice as being well arranged and well written, but there is no excuse for his failure to bring its matter up to date and to correct his mistakes.

LEUCOPATHY.

DR. FEUILLIÉ aspires to revolutionize pathology in his book on *Leucopathies*.[8] He asks that his critics before condemning him should "inject under the skin of a dog in a dozen different doses, 50 to 100 grams of sterilized egg albumen and kill the animal on the following day." His conception is that many diseases which we regard as inflammatory are due to diseases of the leucocytes. Infiltration by leucocytes thus is often merely the aggregation of a number of dead or dying leucocytes seeking to escape from the body through one of the eliminating channels, or poisoned by some local toxin. He calls such an accumulation *leucosis*; if the infiltration occurs in an eliminating channel he terms it *leucexosis*. He thinks this aggregation of leucocytes may be due either to their flying to escape a poison by diapedesis, or in the pursuit of a poison to an eliminating organ, or, being charged with poison, trying to relieve the organism by escaping from it. Leucosis causes infiltration of an organ and leucexosis catarrh of its canal. Leucosis is rapidly succeeded by fibrosis, as in the kidney, for example, where it is not dependent upon inflammation but upon this eliminatory leucosis. Leucopathies are caused by toxins derived from intoxication, autointoxication or acute infections. The result of such infiltration is to cause in the kidney albuminuria, in the cellular tissue oedema, in the liver jaundice, in the lung catarrh, and so on. He thinks this explains the phenomenon of metastasis and affords a better elucidation of the working of derivatives than current theories. The conclusions for which he asks the consideration of pathologists are that the lymphatic cells deserve as much attention in pathology as is accorded them in physiology, and that they possess an activity which enables them to react on their own account in many ways, possessing as they do the faculty of mobility. The various diseases which may affect them may produce modifications in their secretion and their power of phagocytosis, and in the manner described infiltrations, catarrhs, and fibroses of various organs occur without any primitive lesion of the organ itself. The treatment of many diseases now regarded as local ought, he thinks, to be directed to the primary leucopathy, and the principal means at our disposal are bleeding, the production of a fixation abscess, the actual cautery, setons, poisons (mercury), and all the drugs called tonic or alterative. He suggests that the serum of an animal in the course of rapid and intense renovation may perhaps contain and transmit by injection a part of the renovating stimulation and the immunity of that animal.

NOTES ON BOOKS.

THE literature bearing on medical inspection and of a character really useful for the school teacher is as yet very limited in amount. In a recently published booklet[9] Mr. R. C. ELMSLIE has given us an excellent little guide. This pamphlet covers the field of crippled children, and deals with some of the more important of the invalid class, and, while not treating the subjects exactly in a popular way, strikes a happy medium, and gives much valuable information in a manner calculated to interest and educate the school nurse, teacher, or manager. It is well worth perusal by the school doctor, and it is a publication which might with great advantage be followed by others dealing in a similar manner with other children requiring special attention. Provision for the care or treatment of children of the classes referred to in the pamphlet is as yet optional, and only a few authorities have assumed the responsibility, but such a provision is urgently wanted and must ultimately become compulsory, as must the adequate provision for epileptics and mental defectives.

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[6] *Nahrungsmitteltabelle zur Aufstellung und Berechnung von Diätverordnungen.* Von Dr. Hermann Schall und Dr. August Heisler. Second edition. Würzburg: C. Kabitzsch. 1910. (Sup. roy., 8vo, pp. 56. M. 2.50.)

[7] *Food and Hygiene: A Treatise upon Dietetics and Hygienic Treatment.* By William Tibbles, LL.D., M.D. Second edition. London: Rebman, Ltd. 1910. (Post 8vo, pp. 684. 5s.)

[8] *Leucopathies, métastases albuminuries et ictères leucopathiques.* Par Dr. Emile Feuillié. Paris: G. Steinheil. 1909. (Roy. 8vo, pp. 196; 4 illustrations. Fr. 6.)

[9] *The Care of Invalid and Crippled Children in School.* The School Hygiene Publishing Company, Limited, 2, Charlotte Square, W. (Pp. 50, paper covers. 1s.)

THE "Berkefeld" Filter has been awarded three Grand Prix and one diploma of honour at the Brussels Exhibition, 1910.

UNDER the will of the late Mr. Frederick Henry Harrison, of White Hall, Lincoln, Boston Hospital receives a bequest of £1,000, other sums of £250 and £100 going to Lincoln County Hospital and Lincoln General Dispensary respectively.

MEDICAL AND SURGICAL APPLIANCES.

A New Sterilizer for Instruments and Dressings.

DR. G. G. MACDONALD (London) writes: In the practice of surgery the first essential is the aseptic condition of every article and substance which approaches the site of an operative wound. In hospital practice there can be no possible excuse for defects in any of the details of the art of aseptic surgery. Economy has seldom to be considered. The surgeon has at his disposal a perfect operating theatre, trained assistants, and appliances, before, during, and after an operation, and the surgical technique of a well-managed operating hospital is in most cases so perfect that one is apt to lose sight of the vast attention to detail and to the refinements in practice. As in hospital, strict asepsis is the goose that lays the golden egg in the private performances of the surgeon. The ranks of the general practitioner are being more and more filled up by men who have had a splendid training in the practice of aseptic surgery, and it is in their hands that much of the minor surgery, at least, is placed. For the successful carrying out of any operative procedure it is essential to have sterile instruments, sterile sutures and ligatures, and sterile coats to screen off the dust from microbial impurities from the surgeon's, nurses', and patient's clothes, and also sterile swabs, dressings, and bandages. Besides these, efficient preparation of the hands and operation site are also essential. The sterilization of instruments, ligatures, and sutures, and the preparation of the hands and patient's skin can be effected at an extremely low cost, but it is otherwise with the preparation of the aseptic dressings.

The cost of dressings already sterilized and sent out in hermetically sealed tins is prohibitive for the "surgery" doctor, and means a considerable reduction from the fee of any surgeon. For repeated use, if any part of the contents is on one occasion contaminated, the whole tin must be condemned by the conscientious asceptician. For economical reasons every non-essential may have to be shorn from the practice of the general practitioner, but the essentials must be zealously maintained.

To obtain dressings sterile and ready for use it has been frequently shown that an expensive high pressure sterilizer is not an essential. Bacteriologists tell us that saturated aqueous vapour at 100° C. is quite sufficient to kill all organisms and spores. Koch's and Schimmelbusch's sterilizers and their many modifications aim at sterilizing dressings by placing them in current steam, and the kettles used with those sterilizers with open ends or perforated sides are constructed for the passage of steam through the dressings, but it has been shown that current steam is not necessary so long as the vapour is saturated aqueous vapour at 100° C. We can, therefore, rob our sterilization apparatus of all the arrangements for producing high pressure and for producing current steam.

In the preparation of dressings, swabs, etc., it is essential that they be rendered in as dry a condition as possible. Dry dressings, besides being much more comfortable, act as filters and not as carriers of microbes. In the high-pressure sterilizer this quality of dryness is obtained by the creation of a vacuum at the beginning and the rapid escape of superheated steam at the end of the sterilization. In the Koch and Schimmelbusch sterilizers dryness is not obtained with any uniformity, water of condensation being constantly deposited on the dressings.

To attain the essential objects in the sterilization of dressings, apsesis and dryness, I have constructed a sterilizer which is cheap, extremely simple, and absolutely efficient in the production of dry and sterile dressings. The sterilizer is as simple as the pneumatic tyre, being constructed, as will be seen from the accompanying diagram, of an inner and an outer chamber with a space between, and fitted with a lid of a particular form. For use a quantity of water is placed into the space between the cylinders, the dressings, loose or in canisters, are placed in the inner chamber, the lid fixed, the steam exit on the lid opened, and the whole instrument placed on the fire or gas-ring. In a few minutes steam issues vigorously from the escape tap, the temperature of the inner chamber rises to the temperature of the boiling water jacket, the cold air of the inner chamber is expelled, being displaced by saturated aqueous vapour at 100° C. The sterilization is continued for at least half an hour after the steam has begun to issue vigorously from the escape opening. The opening is then closed and the apparatus set aside to cool. The physical principle of aqueous vapour condensing first at the coolest part exposed is made use of to dry the dressings, and a glance at the diagrams will show that all condensation takes place in the outer chamber, the inside of the lid being prevented from cooling by means of a vacuum exhausted between the upper and lower layers of the lid. There is no heat or cold conduction through a vacuum, and therefore the lower layer of the lid remains hot for a considerable time during the cooling, thus effectually preventing any condensation on the lower layer of the lid, which would drip on the surface of the contents of the inner chamber. In consequence, after the instrument has been cooled, the dressings, etc., may be removed, and will be found to be perfectly dry and in the most suitable condition for use, and this without any high-pressure apparatus whatever.

The efficiency of the sterilizer has been repeatedly tested bacteriologically. Anthrax spore threads inside a roll of flannel bandage 10 yards by 6½ in. were destroyed in ten to fifteen minutes. Very resistant saprophytic spores—those of *Bacillus subtilis* and *Bacillus mesentericus*, which resisted boiling for twenty minutes—were destroyed in twenty to thirty minutes, and streptococci, staphylococci, and typhoid bacilli were killed in three to five minutes.

It might be conceived that with the cooling of the apparatus there must be a contraction of the volume of the vapour within, and an aspiration of germ laden air through the crevices of the lid to restore equilibrium. However, if one follows the track of the in-going air one will see how it is deprived of its germ-laden character. It has to pass through three consecutive "traps" before

Fig. 1.

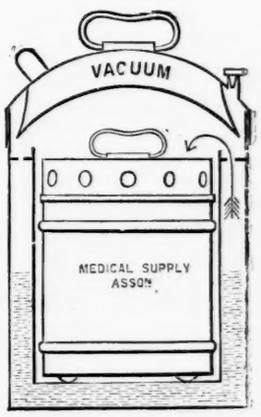

Fig. 2.

it can gain access to the inner chamber, and as Hoffmann, Pasteur, and others have long ago shown, one of these "traps" is sufficient to prevent contamination of the inner chamber from the entering air.

The instruments may be sterilized along with the dressings, as also may be the rubber gloves, coats, towels, etc. The largest sizes are sufficient to sterilize the coats and dressings for one or two major operations; the smallest sizes are designed to sterilize dressings and instruments for post-operative and other wounds, all that is necessary for repeated use being to drop the remains of the dressings and instruments back into the sterilizer and repeat the process. Thus the requirements of the most exacting asceptician can be fulfilled at a very trifling cost.

The sterilizer has been manufactured for me by the Medical Supply Association, 228, Gray's Inn-road, in the following actual sizes:

No. 1.—Canister, 6¼ by 6 in., which can contain ½ lb. cotton-wool bandage, gauze, two towels, rubber gloves, and two nailbrushes.

No. 2.—9 by 9 in., which can hold one operating coat, towels, bandages, cotton-wool, etc.

No. 3.—Holds two drums of size No. 2.

By the use of several drums the practitioner can always have an abundant supply of sterilized dressings ready for any emergency.

Nova et Vetera.

SOME ROYAL DEATH-BEDS.

(Continued from p. 462.)

Queen Anne.

On Saturday, July 31st, 1714, the last Stuart sovereign who reigned over England lay dying in her palace at Kensington. Some months previously the state of Anne's health had given cause for anxiety, but latterly she had appeared better and stronger; and only six or seven weeks before her death Arbuthnot wrote to Swift that the Queen was in good health (June 12th, 1714).

Nevertheless, no one expected her to live very long, and the whole Court was in a ferment over the question of the succession. The universal excitement could not fail to have a disastrous effect upon the ailing Queen, who upon her death-bed told Arbuthnot that the disputes and quarrels of her Ministers had killed her, but she insisted upon presiding over all the meetings of her Cabinet and taking part in the discussions. On the night of July 27th, however, a long and stormy Council, which had agitated her greatly, was abruptly terminated at 2 o'clock in the morning by the Queen's sudden collapse into a dead faint. She was hastily put to bed, where she passed the night in tears, and next morning it was announced that Her Majesty was too ill to attend the Council fixed for that day. It was therefore postponed for a couple of days, but to those about her there can have been little doubt that Anne would never sit at the head of the Council again. Besides occasional fainting fits, the Queen suffered considerable pain, apparently caused by gout, and was by turns feverishly hot and shivering with cold. Moreover, her discomfort was increased by an abscess, attributed to erysipelas, on one of her legs, and from time to time her mind wandered, and she became utterly unconscious of her surroundings. On Wednesday, July 28th, Dr. Shadwell, who was in attendance upon the Royal patient, was made anxious by the state of her pulse, and spoke of it to the Duke of Shrewsbury, who sent Arbuthnot to see the Queen. Arbuthnot, however, apparently found nothing alarming in her condition, for we learn from the *Wentworth Papers* (p. 408) that he "brought the Duke word her pulse was well, and the same thing he made Dr Slown (Hans Sloane) say, for they had always had a mind to keep the Queen's illness a secreet."

In spite of this favourable report, the Queen was too ill to attend the Cabinet Council on the following day, July 29th. Her attendants, for political reasons, hesitated to call a general consultation of the royal physicians, but Arbuthnot took counsel with four of the physicians-in-ordinary, and it was decided that she should be cupped; after this she felt relief and was able to get some refreshing sleep. The following morning, July 30th, the Queen felt so much stronger that she desired to rise and receive the members of her Council, and actually managed to get out of bed. Her attendants, however, alarmed by her extreme weakness and pallor, sent in haste for Arbuthnot, who gave orders for her head to be shaved. In the middle of this operation the Queen fell back in a swoon, which was declared by the doctors to be an apoplectic fit. Her other physicians had been called in, and she was at once bled. She remained unconscious for nearly two hours, whilst her doctors wrangled over her case, politics playing almost as great a part as physic in their disputations. Arbuthnot held out hopes of recovery; on the other hand, a gloomy prognosis was given by Sir Richard Blackmore, who nevertheless thought the patient might linger for a day or two, whilst one of his colleagues, Richard Mead, declared that it was merely a question of minutes. Mead's opinion seems to have been shared by most of those present, for it was only with the greatest difficulty that the Queen was brought round. An emetic was administered without any effect, and it was not until a trial was made of a medicine recommended by Mead that the patient recovered consciousness. At one o'clock Anne was well enough to receive some of her Privy Councillors, but later in the afternoon she had a relapse, and it became clear that she was in serious danger.

A contemporary pamphlet, entitled *The State of the Nation: Containing an Account of the Indisposition and Death of Her late Majesty Queen Anne*, etc., says that "Friday, the 30th of July, was the first time that any Symptoms of Danger appear'd, her Majesty being then seiz'd with a sudden illness, which was follow'd by repeated Convulsion Fits."

Her doctors ordered the application of blisters; and Peter Wentworth wrote to Lord Strafford the same evening that:

> I got to Kingsenton about six o'clock, and whilst I was there her Majesty had the benefit of vomitting thrice by the help of Cardis. Dr Alburtenhead (Arbuthnot) came out and told the company of it and said 'Twas the best symptom they had today, and that she felt pain in her feet, their being garlick laid to't wch likewise was well, and was then gone to sleep. 'Tis now nine o'clock—but they tell me there's no judging how the decease will turn till twelve a clock. I overheard Dr. A—— in a whisper say 'twas ten thousand to one if she recover'd. (*Wentworth Papers*, p. 407.)

Meanwhile a report had got about that the Queen was already dead. On July 31st, Charles Ford, who by Swift's interest had been appointed Gazetteer, wrote to the Dean as follows:

> London, July 31st, 1714. Three in the afternoon.
>
> I don't doubt but you have heard the queen is dead, and perhaps we may be so unfortunate before this comes to you; but at present she is alive, and much better than could have been expected. I am just come from *Kensington*, where I have almost spent these two whole days. I am in great haste; but, till dinner comes up, I will write to you, and give you as full an account as I can of her illness.
>
> Her disorder began between eight and nine yesterday morning. The doctors ordered her head to be shaved, and while it was doing, she fell into a fit of the convulsions, or, as they thought, an apoplexy. This lasted near two hours, and she was speechless, and showed little sign of life during that time; but came to herself upon being blooded.
>
> As soon as she recovered, my lord *Bolingbroke* went to her, and told her the privy council was of opinion it would be for the public service to have the duke of *Shrewsbury* made lord treasurer. She immediately consented, and gave the staff into the duke's hands. The great seal was put to the patent by four o'clock. She continued ill the whole day. In the evening I spoke to Dr. *Arbuthnott*, and he told me he did not think her distemper was desperate. *Radcliffe* was sent for to *Carshalton* about noon, by order of council; but said he had taken physic and could not come. In all probability he had saved her life, for I am told the late lord *Gower* had often been in the same condition with the gout in his head; and *Radcliffe* kept him alive many years after. This morning, when I went there before nine, they told me she was just expiring. That account continued above three hours, and a report was carried to town that she was actually dead. She was not prayed for, even at her own chapel at *St. James's*: and, what is more infamous, stocks arose three *per cent.* upon it in the city. Before I came away, she had recovered a warmth in her breast and one of her arms, and all the doctors agreed, she would in all probability hold out till to-morrow, except *Mead*, who pronounced, several hours before, she could not live two minutes, and seems uneasy it did not happen so. I did not care to talk much to *Arbuthnott*, because I heard him cautious in his answers to other people; but, by his manner, I fancy he does not yet absolutely despair. The council sat yesterday all day and night, taking it in turns to go out and refresh themselves. They have now adjourned, upon what the doctors said, till five. Last night the speaker and my lord chief justice *Parker* were sent for, and the troops from *Flanders*. This morning the *Hanoverian* envoy was ordered to attend with the black box,[1] and the heralds to be in readiness to proclaim the new king. Some of the whigs were at the council yesterday, but not one failed to-day; and the most of the members of that party, in each house, are already come to town. If any change happens before the post goes out, I will send you word in a postscript; and you may conclude her alive, if you hear no more from me, and have no better authority than post-letters to inform you of the contrary. . . .

In the same letter Ford says:

> Eleven at night.
>
> The queen is something better, and the council adjourned till eight in the morning.

On the same date Erasmus Lewis, Secretary to the Lord Treasurer, the Earl of Oxford, and M.P. for Lostwithiel, in Cornwall, wrote to Swift from Kensington:

> At the time I am writing the breath is said to be in the queen's nostrils; but that is all. No hope left of her recovery. . . . We expect the demise to-night.

[1] Contained the instrument nominating the persons, in number thirteen, to be added as lords justices to the seven great officers of the realm.

It has been said by some writers that Anne's last hours were embittered by the thought of her wronged and exiled brother. There is, however, no proof of the truth of this story; and, indeed, the last day of the Queen's life—Saturday, July 31st—was passed in a deep lethargy. Lady Masham, her bosom friend, described her condition that evening in the following terms:

Her pain deprives her of all sense, and in the interval she dozes and speaks to no-body.

Later in the evening the dying woman became delirious, and she died at 7 o'clock the following morning (Sunday, August 1st, 1714) without recovering sufficient consciousness to sign her will or to receive the sacrament. She was in her fifty-first year of age at the time of her death, and had been Queen of England for thirteen years. In a letter to Swift, dated August 12th, Arbuthnot wrote:

. . . My dear mistress's days were numbered even in my imagination, and could not exceed such certain limits, but of that small number a great deal was cut off by the last troublesome scene of this contention among her servants. I believe sleep was never more welcome to a weary traveller than death was to her; only it surprised her too suddenly before she had signed her will; which no doubt her being involved in so much business hindered her from finishing. It is unfortunate that she had been persuaded, as is supposed by *Lowndes*, that it was necessary to have it under the great seal. I have figured to myself all this melancholy scene; and even, if it be possible, worse than it has happened twenty times; so that I was prepared for it.

The causes of Anne's death have been attributed to suppressed gout, ending in erysipelas, which produced an abscess and fever,[1] and her end was probably accelerated by political intrigues and dissensions with which she was surrounded.

The record of the *post-mortem* examination does not throw much light on the cause of death. It is dated August 2nd, and is referred to by Geo. A. Aitken as being among the Sloane MSS. 3984, f. 248. An official copy of the document with the docket is in the possession of Dr. William Cock, who exhibited it at the *conversazione* of the Physical Society held at Guy's Hospital on October 7th. It belonged to Dr. Thomas Lawrence, her senior physician. It is published in the *Guy's Hospital Gazette* of October 15th, from which we quote it:

At the Council Chamber, St. James's, the 3d August, 1714. Present:

Their Excellencys the Lords Justices in Council.

The Physicians called in and Dr. Laurence delivered the following paper, containing an Acct. of what was observed at the opening of her late Majys. Body.

Kensington Palace,
2 August, 1714.

Upon opening the Body of her late Majesty of Blessed Memory, We found a small Umbilical hernia Omentalis without any excoriation, a large Omentum well Coloured. No water in the Cavity of the Abdomen. The Stomach thin, and its inward coat too smooth. The Liver not Schircous, but very tender and Flaccid, as were all the rest of the Viscera of the lower belly. The Gall. Bladder, Kidneys, and Urinary bladder without any stone. There was a very small Scorbutic Ulcer on the left leg. We can give no further account, being forbid making any other inspection than what was absolutely necessary for Embalming the Body.

The following is the docket:

The Physicians' Report to their Excellency's deliver'd by Dr. Lawrence as Principal Physician.

(Signed)	Jo. Shadwell,
Thos. Laurence,	Hans Sloane,
Davd. Hamilton,	Amb. Dickins,
Jno. Arburthnott,	Rd. Blundell.

A true Copy.

(Signed) Edward Southwell.

According to the *Gentleman's Magazine* for March, 1787, vol. lvii, part i, p. 191, the Dr. Thomas Lawrence here mentioned was first physician to Queen Anne and Physician General to the army; he lived to a great old age, and held employment under four successive sovereigns, beginning with Charles II, by whom he was appointed physician to the garrison at Tangier. Dr. Thomas Lawrence, Johnson's friend, was his grandson. The absence of John Radcliffe from the dying Queen's bedside, which is referred to in one of Ford's letters, caused a storm of unpopularity to break on the head of the famous physician. Years before Radcliffe had deeply offended the Queen by his sneer about her "vapours," but so great was his reputation that about noon on July 30th, when it was recognized that Anne was in imminent danger, Radcliffe was summoned by an Order of Council. Radcliffe was unable to obey the summons, being laid up with an attack of gout in the head and stomach at his country house in Surrey. He wrote that he "had taken physic and could not come," and the result of his refusal was that the Queen's death was laid at his door. The public appear to have believed that the mere presence of the great Jacobite doctor would scare away death, and feeling ran so high that when the Queen had breathed her last the mob actually threatened him with assassination. In a note to Charles Ford's letter to Swift, which has been quoted, it is said that

On the fifth of *August*, four days after the queen's death, a member of the house of commons, a friend of the doctor's, who was also a member, and one who always voted on the same side, moved, that he might be summoned to attend in his place, in order to be censured for not attending on her majesty.[2]

Upon this occasion Radcliffe is said to have written the following letter to another of his friends:

Carshalton, August 7, 1714.

Dear Sir,

I Could not have thought, that so old an acquaintance, and so good a friend, as Sir *J—n* always professed himself, would have made such a motion against me. God knows my will to do her majesty any service has ever got the start of my ability; and I have nothing, that gives me greater anxiety and trouble, than the death of that great and glorious princess. I must do that justice to the physicians, that attended her in her illness, from a sight of the method, that was taken for her preservation by Dr. *Mead*, as to declare nothing was omitted for her preservation; but the people about her, the plagues of *Egypt* fall on them, put it out of the power of physic to be of any benefit to her. I know the nature of attending crowned heads, in their last moments, too well to be fond of waiting upon them, *without being sent for by a proper authority*. You have heard of pardons being signed for physicians, before a sovereign's demise; however, ill as I was, I would have went to the queen in a horse litter, had either *her majesty*, or *those in commission next to her*, commanded me so to do. You may tell Sir *J—n* as much, and assure him, from me, that his zeal for her majesty will not excuse his ill usage of a friend, who has drank many a hundred bottles with him; and cannot, even after this breach of a good understanding, that was ever preserved between us, but have a very good esteem for him. I must also desire you to thank *Tom Chapman* for his speech in my behalf, since I hear it is the first he ever made, which is taken more kindly; and to acquaint him, that I should be glad to see him at *Carshalton*, since I fear (for so the gout tells me) that we shall never more sit in the house of commons together.—I am, etc.,

John Radcliffe.

How real was Radcliffe's fear of being made the victim of popular violence is shown by the following letter, directed to "Dr. *Mead*, at *Child's* coffee-house, in *St. Paul's Churchyard*."

Carshalton, August 3, 1714.

Dear Sir,

I Give you, and your brother many thanks for the favour you intend me tomorrow; and if there is any other friend, that will be agreeable to you, he shall meet with a hearty welcome from me. Dinner shall be on the table by two, when you may be sure to find me ready to wait upon you. Nor shall I be at any other time from home, because I have received several letters, which threaten me with being pulled to pieces, if ever I come to *London*. After such menaces as these, 'tis easy to imagine, that the conversation of two such very good friends is not only extremely desireable, but the enjoyment of it will be a great happiness and satisfaction to him, who is, etc.,

John Radcliffe.

Radcliffe died on November 1st the same year, having survived the Queen only three months; and it is said that the dread of assassination and the want

[1] *Dictionary of National Biography.*

[2] Letters written by the late Jonathan Swift, D.D., Dean of St. Patrick's, Dublin; and several of his friends; from the year 1703 to 1740. Published from the originals; with notes, explanatory and historical, by John Hawkesworth, LL.D. London: Printed for R. Davis in Picadilly; T. Davies, in Russel-street, Covent Garden; L. Davis and C. Reymers, in Holborn; and J. Dodsley, in Pall-Mall. MDCCLXVI. Vol. i, p. 500 et seq.

of company in the country village which he was afraid to leave shortened his life. He was, in the words of an old biography, "a victim to the ingratitude of a thankless world and the fury of the gout." John Radcliffe had been appointed physician to Anne in 1686, but soon fell into disfavour owing to the roughness of his manners. When Anne came to the throne, she could not be persuaded to reinstate Radcliffe. When urged by those about her to do so, she replied that he would send her word, as he had done before, that her ailments were nothing but the vapours.

Of her physicians, John Arbuthnot was unquestionably her favourite. In 1705 he was appointed Physician Extraordinary to the Queen "by her Majesty's special command, in consideration of his good and successfull services perform'd as Physitian to his Royal Highnesse" Prince George of Denmark. As early as in 1703 he had attended the Queen and her children. In 1709 he was appointed Physician in Ordinary to the Queen. Of the confidence reposed by Queen Anne in him, numerous proofs are to be found in Swift's *Journal to Stella*. Thus, under date August 10th, 1711, we find mention of "Dr. Arbuthnot, the Queen's physician and favourite." On September 8th, reference is again made to "Dr. Arbuthnot, the Queen's favourite physician, a Scotchman"; and in 1712 a rumour that the Queen was inclined to a dropsy is denied on the authority of "her physician Arbuthnot, who always attends her."

Scandal lovers may perhaps find in this denial some confirmation of a belief which has survived even to the present day, that Anne was given to drink. Whether this be true or not, she seems to have been much given to physic. We are informed by Dr. Cock that when Wandsworth Manor House was altered some twenty years ago, a cupboard was found full of phials and gallipots, and other vessels for the administration of medicine of the kind used at the time when the Manor House was the country residence of the Queen and Prince George. The physic may, of course, have been intended for her children, only one of whom survived to the age of 10.

Immediately after the Queen's death, Arbuthnot left his rooms in St. James's Palace and moved to Chelsea

THE TREATMENT OF CANCER BY X RAYS.

By Charles G. Barkla, M.A., D.Sc,
Professor of Physics, King's College, London,

The address delivered by Sir J. J. Thomson before the British Medical Association in July turned the attention of the writer to the work that is being done in the diagnosis and treatment of disease by x rays. A study of the methods employed and of the results obtained leads to many practical suggestions. One of these appears of sufficient importance to justify the present communication from a physicist.

It has apparently been fully demonstrated that certain diseases of the skin, in particular cancerous diseases in and near the skin, have been relieved and cured by the action of x rays, while similar diseases affecting deeply seated organs have been influenced but little, if at all, by the rays. I suggest that the difference in the results is due to the difference in the treatment which the diseased tissues have actually received.

The most fundamental change which has been observed in matter traversed by a beam of x rays is that which appears in the gaseous state as ionization. [There is no doubt that a similar process takes place in the solid and liquid states, though in these the final conditions of the ions are different] This process of ionization involves the absorption of energy from the beam of x rays transmitted. Where there are little absorption and little ionization we may certainly expect—indeed it may safely be asserted—there is little physiological effect.

Now, the disadvantages of the methods at present used are the following: (1) The treatment is not confined to the diseased tissue—in fact, the healthy portions of the body are subject to a more intense radiation than the portions which it is desired to transform into healthy tissue; (2) the radiation which reaches the diseased tissue is necessarily of a penetrating type, and, as a consequence, passes through that tissue with little absorption of energy and little ionization of the atoms constituting that tissue. This is obviously the case to a certain extent, but it is much more so than is suspected, for these penetrating radiations, while passing through the light atoms which constitute the flesh, lose by far the greater portion of their energy by simple scattering, and not by true absorption. Thus the density of a shadow cast by an organ upon a fluorescent screen or photographic plate is no true measure of the energy absorbed by that organ, even if the beam be homogeneous, but is more correctly a measure of the energy lost by the direct beam by scattering, and received by the surrounding organs. Owing, then, to the facts that the more efficient ionizing radiations are absorbed by the superficial layers of flesh; that the penetrating radiation is so penetrating as to pass through the affected portion with little absorption; that what little is apparently absorbed is in reality largely redirected, it is undeniable that little energy is truly absorbed and little ionization takes place in the diseased tissue. The absence of appreciable physiological action follows as a consequence.

Now the treatment may be both enormously intensified and localized in a particular portion of the body, as will be seen from what follows.

Elements of high atomic weight scatter only a small fraction of the radiation trasmitted through them, but they transform this radiation into much more absorbable and more intensely ionizing secondary radiations of two types, soft x-radiation characteristic of the particular element emitting it, and corpuscular radiation in character like the β-radiation from radio-active substances. The total energy of these two radiations is certainly a large fraction of that of the primary beam lost during transmission. Also the proportional absorption of these radiations by light atoms to that by heavy atoms is very much greater than in the case of the original penetrating radiations. If, therefore, a mixture of heavy and light elements be subject to a penetrating x-radiation, the heavy elements absorb much of this radiation, and re-emit a large fraction of the energy in the form of these absorbable radiations, which, proceeding in all directions, produce greatly increased ionization in the light atoms in the immediate neighbourhood. Thus, if we inject a substance containing a heavy element into the diseased portion of the body, an intense penetrating radiation will pass through the surrounding tissue with little effect, and will in the diseased tissue be transformed into highly efficient ionizing radiations, which are practically completely absorbed within that diseased tissue.

The state of chemical combination of the element does not affect the process, as in a substance such as bismuth carbonate the constituent bismuth acts as the transformer. Also the more widely distributed the injections through the portions it is desired to treat, the more effectively is the transformed radiation distributed, for large masses of radiating substance absorb their own radiations to a large extent.

To give an idea of the magnitude of the increase in ionization we will suppose half a gram of bismuth carbonate distributed through a cubic centimetre of flesh. The ionization produced in the flesh itself by a transmitted radiation would through the agency of the bismuth probably be of the order of thirty, forty, or fifty times that produced by direct action of the rays. The most suitable concentration of the injected substance, and the exact increase in efficiency due to an injection, would, however, depend on the penetrating power of the radiation used, and upon the thickness of the diseased tissue, as screening of deeper layers would occur and necessitate diminished concentration. In the treatment of thin layers of flesh—say a few millimetres thick—the efficiency would be of the order above stated, but even in the most unfavourable cases in which the affected portion is not less than several centimetres deep in any direction, the efficiency need not sink to less than ten, or perhaps twenty, times that of the direct radiation. It would at this stage be an unnecessary refinement to discuss the relative efficiencies of various elements.

The advantages of such a treatment, where practicable, are sufficiently obvious to need no further comment.

In conclusion, a word of warning ought to be given against the practice of taking bismuth carbonate into the system for observational purposes with the use of x rays,

for a membrane covered with only a very thin layer of bismuth carbonate is during the transmission of x rays exposed to a very violent treatment by soft x rays and corpuscular rays. If these membranes are sensitive to such radiations—it is difficult to conceive of them being otherwise—the results must be serious. If the bismuth carbonate be strongly diluted with a large quantity of food, the food itself absorbs the greater part of the radiation, but the relative amount by weight of food to bismuth carbonate would need to be great to sufficiently protect the membranes during prolonged exposure.

ASSOCIATION OF CERTIFYING FACTORY SURGEONS.

Annual Meeting.

The annual meeting and dinner of the Association of Certifying Factory Surgeons took place at the Queen's Hotel, Manchester, on Friday, November 4th. The meeting was also the first statutory meeting of the association on incorporation. Dr. W. F. Dearden, of Manchester, who has acted as honorary secretary for the past eleven years, was elected president, Dr. T. W. Heywood, of Darwen, succeeding to the secretarial duties. With these two exceptions the whole of the previous year's officers and council were re-elected. It was reported that most of the old members had transferred their membership.

Dinner.

Dr. Dearden presided over one of the best attended gatherings in the history of the association, the explanation being that his assumption of office was to be made the occasion of a handsome presentation from the members. This took the form of a tray, tea-set, and entrée dishes, in silver, with a souvenir bracelet for Mrs. Dearden. After the toast of "The King" had been duly honoured, Dr. T. Fort, in making the presentation, said that the gift might be regarded as an indication of appreciation and good feeling from practically all the members. He spoke highly of the work of Dr. Dearden during his eleven years of secretaryship, mentioning, among other matters, the trebling of the membership during the first four years of his office, and his great efforts towards standardizing the methods of examinations and reasons for rejections by certifying surgeons. He pointed out that since powers were obtained, in 1901, Dr. Dearden had never ceased from impressing upon members the importance to industry and to young people of taking the fullest advantage of the privilege of affixing conditions to certificates. He was quite satisfied that the people who were getting the benefit from these labours were the juvenile workers themselves. He drew attention to the valuable scientific and organizing work which the president had taken in hand in connexion with the particular province of industrial hygiene, and to the fact that his successful endeavours in getting together a powerful national committee, and so excellent a series of papers, for the recent International Congress on Industrial Disease had already been rewarded by his appointment as a member of the Permanent International Committee for the Study of Diseases of Occupation.

Dr. Dearden, on rising to return thanks for the presentation, met with an enthusiastic reception, including the usual musical honours. He said that the kindness of his colleagues was overwhelming, and that he had thought a sufficient honour had been conferred in selecting him, that afternoon, to be the first president of the newly incorporated association. He cordially thanked the members for the very handsome pieces of silver, and the pretty token to his wife, and was particularly impressed with Dr. Fort's statement that nearly every member of the association had contributed. Apart from the value of the present, this latter fact was to him a pleasing proof that his eleven years' labours as their honorary secretary had met with universal approbation. Dr. Fort was somewhat too flattering in attributing to his efforts the more or less successful undertakings mentioned, and he thought it would be only fair and correct to point out that their very hardworking and businesslike council should share any credit which might be due. Their greatest triumph had, of course, been achieved when they succeeded in securing the retention of the old statutory obligation requiring the investigation into the causation of so-called preventable factory accidents by the certifying surgeon, and this was principally owing to the way in which every individual member used his efforts to convert to his way of thinking any member of Parliament with whom he happened to be acquainted. The British Medical Association were also entitled to a large share of credit for the ready manner in which they threw their powerful influence into the scale at a critical moment, and he should always hold that certifying surgeons owed a debt of gratitude to Sir Victor Horsley for the convincing manner in which he advocated the views of that great organization before the then Parliamentary Under Secretary of State. He was, however, quite prepared to admit that he had devoted a considerable amount of spare time to the service of the certifying surgeon. The modern and only successful method by which a body of men engaged in the same calling can hope to improve their common condition was by association, and he had striven hard to convince certifying surgeons of this principle, which stood for uniformity of views and uniformity of action. He was proud of having in his possession a letter from the late A. J. Mundella informing him of the defeat of a clause which had been inserted in the Factory Bill of 1891 with the object of abolishing the certificate of fitness, and in which he wound up by saying, "You will hear no more of the clause, but the surgeons in future must do their duty." Securing uniformity of method in carrying out the duties of the office was the way to obtain the fulfilment of Mr. Mundella's undoubtedly strong view, and that the association was doing it could be shown by results. The departmental returns for 1900, at the beginning of which year he took office, showed that 1,882 certificates had been refused for physical incapacity; each year these figures had gradually improved, until during 1909 they had gone up to 7,738. The association had convinced the authorities of the tremendous advantage to juvenile labour of legalizing the regulating of the nature of employment to the physical capacity of the applicant by authorizing the certifying surgeon to affix conditions to his certificate; and it was members of the association who were responsible for the 5,775 conditional certificates granted last year. He was proud of the way in which members had of late years shown this intimate knowledge of industrial conditions in many valuable contributions to books, journals, and congresses, and was convinced that the certifying surgeon only required to be better known to be properly appreciated. The work of this official was certainly well thought of by Continental experts, and there did not appear to be much doubt that Belgium, at any rate, intended creating a similar service. He spoke of the directions in which the utility of the certifying surgeon could be extended, and strongly advocated the attachment to each superintending inspector's district of one or more medical inspectors who, among their other duties, would supervise and direct the work of the certifying surgeon.

Dr. J. Brassey Brierley proposed the toast of "The Houses of Parliament," which was responded to by Mr. A. A. Haworth, M.P., who said that progressive legislation was necessarily slow, as Parliament could not legislate one inch in front of public opinion; and that experience of the past had fully supported this view. In their undoubtedly praiseworthy efforts they must aim to carry the people with them, and if they did this they need not despair of improvement. Although meeting many rebuffs, factory legislation now proposed would undoubtedly pass into law, and, along with older Factory Acts, would be looked upon in times to come as one of the factors in the march of civilization and progress.

Sir William Bailey, in proposing "The Factory Department of the Home Office," made a comparison between the excellent laws of Spain, with their practical nullity through maladministration, and the exceptionally good results accruing from what he termed a wise elasticity of administration exercised by the department under the control of gentlemen present that evening.

Professor G. R. Murray, in replying to "Our Guests," expressed the view that any philanthropic employer of labour who wished to devote a sum of money to a really good object could not do better than found a research scholarship for the study of industrial disease.

THE AFTER-CARE OF CONSUMPTIVES.

A LARGE number of representatives of sanatoriums and health associations took part in a gathering convened by the Charity Organization Society on the afternoon of November 4th, for the purpose of discussing the problem of caring for consumptive patients after they have passed out of sanatoriums. Colonel MONTEFIORE presided, and the conference was opened with a short paper by Miss JANE WALKER, M.D., of Mallings Farm Sanatorium, who put forward the axiom that if sanatorium treatment were to be effective, especially in the case of the poor and the working classes, it must not end with the patient's departure from the institution. Sanatoriums were educational as well as curative establishments, and the education should have regard to the patient's future as well as to his present, and to his circumstances in life as well as to his hygiene. A loafing habit must not be fostered, and the work given in the sanatorium must, if possible, be the kind of work that the patient would have to take up on going out into the world. The best work for the discharged patient was, with few exceptions, the work he had been doing before admission; for the simple reason that at this form of employment it was probable that he could earn most money, and therefore anxiety, which was a most potent factor in retarding the complete cure, was reduced to a minimum. Even an unsuitable occupation which relieved the ex-patient from financial worry was better than an ideal occupation which produced little money. Unfortunately, many employers refused to take back an employee who had had consumption, and the worst offenders in this respect were some departments of the public service, notably the navy. (In some remarks made subsequently, however, Dr. Walker said that this stricture did not apply to the police department, where the ex-consumptive received consideration.) As an ideal employment she recommended French gardening, for which there seemed to be an increasing scope. She thought that in many cases it was a mistake to advise consumptive patients in the town to give up their work and find employment in the country. The important point was that their leisure should be spent healthily. Two years was the minimum period for which a discharged patient required careful watching, and to carry out this supervision she advocated the utilization of existing agencies for helping the poor—the labour exchanges, the charity organizations, and the tuberculosis dispensaries. Any scheme, she insisted, must be national in its character.

Dr. BURTON-FANNING, of Kelling Sanatorium, Norfolk, supported the contentions of Dr. Walker, and gave an interesting analysis of the fortunes of 306 first-class or mild cases discharged from the sanatorium. It was found that 60 per cent. had returned to their original occupations, and that only 8 per cent. had failed to obtain employment. The statistics of those who had taken up outdoor and indoor work respectively were surprisingly even:

	Well.	Fairly Well.	Worse.
	Per Cent.	Per Cent.	Per Cent.
Outdoor	76	12	10
Indoor	73	11	15

The speaker bore testimony to the consideration with which many employers treated their men on their return from a sanatorium. It was important that the work given to such employees should be carefully allotted and supervised, and should be not too laborious.

From the same institution came Dr. MCCONNEL, who said that at Kelling everything that was possible was done to fit the patient to earn his living, although, of course, in the case of women, who had good homes to return to, the necessity for labour training was not so great.

Mrs. ESTHER CARLING, M.D., of Maitland Cottage Sanatorium, desired to switch the question of the after-care of ex-patients on to the campaign against consumption, and suggested that a magazine devoted to the matter would be of great assistance. She warmly commended the successful efforts of Dr. Davies, the Medical Officer of Health for Woolwich, to get the Woolwich Arsenal authorities to treat ex-patients from sanatoriums more sympathetically, the result being that advice was sought at an earlier stage, as the men were not now in fear of discharge if found to be victims of the disease.

Mr. E. S. KEMP, the secretary of the Medical Committee of the Charity Organization Society, also dwelt upon the necessity of educating the employer as well as the ex-patient. He read a letter from Dr. Davies, of Woolwich, pointing out that his (Mr. Kemp's) society could do a good work by establishing local after-care subcommittees.

The folly of giving the advice as a matter of course that a sudden change of occupation was necessary when tuberculosis was discovered in a patient was emphasized by Dr. PATERSON of Frimley. He agreed with Dr. Walker in saying that an unsuitable and ill-paid employment was no remedy. Dr. GLOVER LYON, of Victoria Park Hospital, urged that it was now the duty of the State to interfere, and to ensure that all sanatorium ex-patients were under the care of some public body. Later, the same speaker joined issue strongly with Dr. Robert Maguire, of Brompton Hospital, who expressed the opinion that the public had been over-educated in the infectiousness of consumption, and that there was no danger of infection unless the phthisis were in active stage or proper care were not taken. Dr. Glover Lyon insisted upon the recognition of the infectious character of the disease.

The remainder of the meeting was in the hands of lady speakers, who brought some practical contributions to the discussion.

Miss CURTIS, of Hammersmith, pointed out the peculiarly hard case of the domestic servant seeking a return to her former occupation, and also that of the married woman going back to the home of a poor, out-of-work husband.

Miss MCGALL hoped that one day there would be a working-farm colony in London, such as had been tried in the North.

Mrs. NORMAN MOORE suggested the compilation of a list of employers willing to give work to persons who had been in sanatoriums, and Miss DALTON a magazine propaganda on the subject.

Mrs. PEARSE gave the history of a number of discharged patients who had come within her experience, and Dr. JANE WALKER, in replying upon the whole discussion, would not agree that the public had been over-educated on the subject, although probably in some respects there had been miseducation.

ASSOCIATION OF PUBLIC VACCINATORS OF ENGLAND AND WALES.

THE annual meeting of this association was held at the Hotel Cecil, London, on October 28th, under the presidency of Dr. J. C. BRADSHAW (Liverpool). The meeting was chiefly occupied by a discussion on the internal affairs and a consideration of suggestions for increasing the usefulness of the association. Dr. A. E. COPE (London) received a very hearty call to the presidential chair for the ensuing year.

In the evening the annual dinner was held at the Hotel Cecil, the newly-elected PRESIDENT being in the chair. Letters of regret at inability to be present were mentioned from Sir James Crichton-Browne, Dr. Dawson Williams (BRITISH MEDICAL JOURNAL), Dr. J. Smith Whitaker (British Medical Association), Dr. Francis T. Bond (Gloucester), and others. Among the guests present were: Dr. A. P. Hillier, M.P., Dr. Farrar (Medical Inspector, Local Government Board), Dr. Parsons (*Lancet*), G. S. Elliston, Esq. (the *Medical Officer*).

The PRESIDENT proposed "The Association of Public Vaccinators of England and Wales," and drew attention to his connexion with that association from its very beginning. Dr. J. C. BRADSHAW responded. Dr. J. FOSTER PALMER, in an entertaining speech, proposed "The Guests."

Dr. A. P. HILLIER, M.P., in replying, spoke of the great pleasure he felt in meeting so many of his professional brothers who were engaged in that too little recognized but profoundly valuable branch of medical practice which dealt with the application of preventive medicine. When a future historian came to deal with the present age he would record of to-day that there was nothing more markedly distinguished that period than the wonderful

works which began with Jenner and which had been continued by Pasteur, Lister, and Koch to such an extent as to have conferred upon mankind at large probably a greater benefit than any other body of men the world had ever seen. They still had sceptics among them, but they might console themselves that there were still people who believed the world was flat and that mankind had benefited nothing from experiments performed on the lower animals. These people could all be placed in the same category as those who thought vaccination to be useless. Dr. Hillier recounted his experiences during an epidemic of small-pox in South Africa in an unvaccinated community. There he found conscientious objectors whose objection he could understand because among the Mohammedans it was an article of their faith that to withstand disease was an insult to the Deity. Their objections, he said, might be excusable, though many of them in the end accepted vaccination, but for the life of him he could not understand how the conscience of the objector in this country came into the question. Having drawn attention to the rapid increase in the number of exemptions from vaccination in this country, Dr. Hillier said he did not believe that small-pox could be successfully combated by simply vaccinating contacts. He concluded a vigorous and impressive speech by suggesting that if the bulk of the profession held the opinion just expressed the time had come when the leading men of the profession should meet to make a public protest on that question. Nothing would carry more weight with the House of Commons than an opinion judiciously expressed by the leaders of the profession.

Dr. Drury (Halifax) proposed the toast, "The Public Health and Poor Law Service." This toast was coupled with the name of Sir Henry Newton (Newcastle-on-Tyne), to whom Dr. Drury offered congratulations on the great honour he had received from His late Majesty King Edward. Sir Henry was a vice-president of the association, and the association was delighted to recognize the honour.

Sir Henry Newton responded, and spoke of the continual state of annoyance caused in the Newcastle Union by the repeated attempts of the guardians to reduce the fees to the absolute minimum. He contended that something should be done without delay to amend the position in which public vaccinators found themselves owing to the irritating results of the power of the guardians to give twenty-eight days' notice.

On the proposition of the President, the health of both the Organizing Secretary (Mr. Charles Greenwood) and the Editorial Secretary (Dr. Drury) was enthusiastically drunk. The replies of each of these concluded a very enjoyable evening.

DR. HADWEN AND THE "CRIMSON CROSS REMEDIES."

In the Journal of May 7th one of the series of articles on Secret Remedies appeared dealing with "The Crimson Cross Remedies." In a separate paragraph of the same issue attention was drawn to some of the remarkable claims made on behalf of these remedies. Reference was also made to the fact that an advertisement had frequently appeared on the cover of the *Vaccination Inquirer* announcing the Crimson Cross Remedies as "a simple solution of the vaccination question," and that they "render the patient non-infectious." In the advertisement the name of Dr. Hadwen appears, and a statement that he had investigated, compiled, and contributed to the medical press certain remarkable figures showing the superiority of treatment with the Crimson Cross Remedies over all other treatment during the Gloucester epidemic of small-pox. Miss Beatrice Kidd (Secretary, British Union for the Abolition of Vivisection), in a letter referred to in the Journal on May 21st, appears to have keenly resented what she described as our taking advantage of the opportunity afforded by the advertisement of associating the name of Dr. Hadwen with a quack remedy. As will be seen from the correspondence below, Dr. Drury of Halifax sent Dr. Hadwen copies of the articles in the Journal. In the postscript to his letter Dr. Hadwen not only gives permission but desires the publication of his letter. Dr. Drury wishes us to state that he has delayed submitting this correspondence in the hope that Dr. Hadwen might reply to his second letter repeating the request for particulars of the investigations advertized as having been undertaken by Dr. Hadwen. No reply, however, has been received to Dr. Drury's letter of July 10th.

[Copy.]

Halifax,
June 5th, 1910.

Dr. W. R. Hadwen,
Gloucester.

Dear Sir,

If you have any details concerning the marvellous efficacy of the Crimson Cross Remedies in small-pox said to have been "investigated" by you, I should be glad to publish the same if you will kindly allow me to do so.

Yours truly,
Arthur Drury.

Brunswick House,
Brunswick Square,
Gloucester.
June 13th, 1910.

Arthur Drury, Esq.

Dear Sir,

I duly received your letter of the 5th inst. enclosing a reprint from the British Medical Journal of May 7th and a cutting from the same of May 21st, together with a reprint of correspondence between yourself and Mr. Arnold Lupton.

I beg to apologize for not acknowledging the receipt of your communication earlier, but my prolonged absence abroad and the accumulation of work awaiting me on my return to Gloucester on the 9th must plead my excuse for the delay.

1st. With regard to the advertisement of Captain Feilden in the *Vaccination Inquirer* to which reference is made, I have looked in this month's issue and have now seen it for the first time, but although some figures of mine are quoted, my name does not appear to be mentioned. I know nothing of the matter except from the editorial articles you send me.

2nd. I am well acquainted with the Ointment which Captain Feilden supplies, although I have never personally used it, nor have I ever recommended it except in a tentative way as I will presently explain. It is not a quack remedy, as I understand the meaning of that term, inasmuch as it is not a secret or bogus remedy advertised by a charlatan for his own personal gain. I have respect both for the preparation and for the gentleman who makes it, although I have never met him personally. He seems to me to be a very sincere and honest man.

3rd. There was no need for the British Medical Journal to take the trouble to analyse it, as its composition was long ago published in the medical press, and Captain Feilden has been most assiduous in offering it to Hospitals, to Medical Institutions, and to medical men, and I understand he invariably informs them of its composition.

4th. During the Gloucester Epidemic of Small-pox of 1895-6 the ointment was largely manufactured locally from Captain Feilden's recipe. He did not himself derive profit from it, and he has always appeared to me to be very unselfish in the matter. Its composition is simply Beeswax, Linseed oil, Resin, and Acetate of copper. The latter is largely used by Agriculturists for fungoid growths of all kinds both among animal and vegetable life, and it may be useful in acute eruptive diseases in the human. I am not prepared to say. I have no scientific proof of its specific value. The *post hoc ergo propter hoc* argument which is used not only by Captain Feilden but by orthodox medical men for their own pet remedies—including vaccination—does not appeal to me.

5th. The claims which Captain Feilden in his enthusiasm makes on behalf of his ointment (according to the extract you send me from the British Medical Journal) as a cure-all for almost everything I know nothing about, nor do I gather that I am held responsible for them or for the glowing statements embodied in those claims.

6th. If, however, as I gather from the British Medical Journal articles, Captain Feilden has quoted me as stating, as the result of my investigations, that "cases where his ointment was used during the Gloucester epidemic of 1896 show a lower percentage than those otherwise treated," he is quite within his right in doing so, and I am prepared to justify both him and myself respecting this assertion.

7th. I have some large manuscript books containing the names and addresses and methods of treatment, etc., collected independently, of practically all the cases of small-pox during that epidemic, and those books are open to the inspection of any one who likes to call upon me at my private residence, Brunswick House, Brunswick Square, Gloucester. I have repeatedly made the same offer. The summary is as follows:

(*a*) Two hundred cases treated by hydropathy, taking them straight on as they came, had a fatality of 10 per cent.

(*b*) Captain Feilden claims some 500 or 600 cases, I believe, with a fatality-rate of about 1 per cent. But the figures I have collected represent 260 cases, certified by medical men as small-pox, with 4 deaths. That is, about 2 per cent. fatality treated with the "Crimson Cross Ointment."

(*c*) The total number of completed cases under treatment in the Gloucester Small-pox Hospital for the twelve months prior to the advent of Dr. Brooke from the Metropolitan

Asylums Board—a period of the most scandalous maladministration ever conducted, I believe, by a municipal body, when there was really no treatment whatever—was 277, with a mortality of 151—that is, 54.51 per cent.

(*d*) The total number of completed cases during Dr. Brooke's administration (including 281 of the poor creatures he took over on April 24th, 1905) was 426, with 38 deaths—that is, a fatality of 8.92.

(*e*) The average death-rate for the whole epidemic was 27.2 per cent.

8th. Now, I have said I have only tentatively recommended Captain Feilden's ointment, and in view of my published figures this attitude may appear paradoxical. My explanation is simple. Whilst in no way presuming to declare that the acetate of copper (verdigris) contained in the ointment, upon which Captain Feilden chiefly relies, is useless, I am bound to say that I am not yet convinced that it possesses the curative virtues attributed to it by him. Whatever virtue the ointment may possess lies, in my opinion, in the oil. My reason for thinking so I will explain.

9th. I have frequently been struck in the course of my practice by the soothing and apparently beneficial effect which oil possesses in various eruptive diseases, such as scarlet fever, measles, and inflammatory conditions. Its use in the East has been almost universal from time immemorial. And my own impression is that the apparent beneficial effect of Captain Feilden's ointment in small-pox cases is due to the oil contained in it rather than to the acetate of copper. My opinion has been confirmed by the following facts: Since the Gloucester small-pox epidemic of 1896 we have had about a dozen cases of small-pox, chiefly imported, all of which were removed to the Isolation Hospital. I was then on the Sanitary Committee of the City Council and official visitor to the Isolation Hospitals, and by the courtesy of the Medical Officer of Health I was permitted to adopt my method of treatment in every case. I visited them daily. (I may say incidentally that, so far as I know, I have never been vaccinated.) The charge nurse entered enthusiastically into the work. The patients had warm baths at least twice in the day, and when too ill to go to the bath-room they were repeatedly sponged. A bowl of oil was kept always by the bed-side, so that they could anoint themselves over all irritable parts. The face especially was continually dabbed. Some of these cases were of a very bad confluent type, but all recovered, and recovered without pitting, which I attribute to the treatment. In the early part of the small-pox epidemic of 1896, when the death-rate was so heavy, no water whatever was used in the hospital, even though the patients had been inmates for weeks. Only the strongest survived. When Dr. Brooke arrived he found all the baths filled with soiled and foul linen. He instituted a new régime, adopted the free use of warm baths, and in some instances oil applications, with the result, as I have shown, a rapid decline in the death-rate.

10. From a very careful study of small-pox disease and its prevention and treatment, I have found that outbreaks may invariably be traced to insanitary and unhygienic conditions. I believe overcrowding and ill ventilation play a very serious part in its spread. This was markedly so in Gloucester and Middlesbrough. In the Gloucester Small-pox Hospital during the early part of the epidemic the patients had only 500 cubic feet of air space each. The type of disease appears to be settled at the time of attack, and to depend pretty much upon the character of the vital resisting powers of the patient; recovery seems to depend practically upon three things—the type of disease, environment, and treatment. I have not found that vaccination exercises any influence whatever upon small-pox, unless, perhaps, it might lower the vital resisting powers by setting up a morbid process in the system. I have repeatedly seen small-pox and cow-pox eruptions maturating side by side, which to my mind is proof positive that there is no antagonism between them. This was Woodville's puzzle in the Old London Small-pox Hospital, which led him to the rather illogical conclusion (since adopted by the profession generally) that some time must elapse before the cow-pox inoculation could be protective. But if it could not protect when in its acutest form, it is difficult to see how it could protect when the vesicle had become a scar!

The *discrete* cases of small-pox almost invariably recover whether vaccinated or not. This is the record of all time. The *malignant* cases almost invariably die whether vaccinated or not. This also is proverbial. They usually occur when the personal and surrounding conditions are very bad. We had 29 malignant cases in Gloucester, all vaccinated, and all died. The real battle of life and death lies with the *confluent* cases, and here the question of environment and treatment comes in—that is, of course, supposing the constitution itself is capable of battling with the disease. And I believe that no treatment can equal warm water bathing and applications of oil.

11. Allow me two words in conclusion relative to the criticism of the BRITISH MEDICAL JOURNAL which you enclose.

(1) The Editor's criticism of Miss Beatrice Kidd is not justified. The kind and loyal defence on my behalf offered by this very clever lady during my absence abroad was absolutely logical. Captain Feilden has only quoted me, I understand, in connexion with my published figures relating to the different methods of treatment adopted in the epidemic of fourteen years ago. He is quite justified in selecting these from my writings, and it does not in any way commit me to any extravagant views he may hold about his remedy for small-pox or any other diseases. Miss Kidd has made no attempt "to extricate Dr. Hadwen from the position in which he is placed by the association of his name with a quack medicine." Her sole attempt was to repudiate the Editor's ungenerous effort to fix upon me a stigma which does not exist. In this she succeeded.

(2) I believe Captain Feilden to be a genuine and honest man. His faith in his ointment, judging by letters I have received from him, is unbounded. And there are grounds for his faith, inasmuch as an oleaginous compound is likely to prove beneficial in many eruptive conditions. That the preparation is empirical is, of course, a fact, but so are many of the most reliable drugs and preparations of orthodox medicine. Captain Feilden, at least, does no harm, and I think it scarcely dignified to make an absolutely honest man who advocates what is, to say the least of it, a harmless remedy, the composition of which he makes no secret of, and which he advertises, not for profit, but out of sheer enthusiasm and love of doing good—the butt for unnecessary medical editorial sarcasm.

Believe me,
Yours very truly,
WALTER R. HADWEN.

P.S.—You are at liberty to publish this letter; in fact, considering the criticism in the BRITISH MEDICAL JOURNAL, and presuming that some notice of it has appeared in your publication, I shall be pleased by your doing so. I enclose a couple of my pamphlets, which may interest you if you have not already seen them.

[Copy.]

Landon House,
Halifax.
July 10th, 1910.

Walter R. Hadwen, Esq.,
Gloucester.

Dear Sir,

Absence from home has prevented me from replying to your letter earlier.

Taking your points in numerical order:

1st. I am astonished to hear that so active an antivaccinator as yourself missed seeing the prominent advertisement in which your own name appeared for six or seven consecutive months last year in the official organ. Your name disappeared from the advertisement in the very next issue of the *Inquirer* after a reference to the "humorous advertisement" in the *Jennerian*. Why? This was last September.

2nd. You say it is not a quack remedy. Miss Kidd calls it a quack remedy, and I gather from your letter she is a "very clever lady." Any person whose mind was not warped with prejudice would call it a quack remedy after perusing the literature supplied to puff the remedy.

3rd. You say the composition was long ago published in the medical press. Where?

4th. I am glad to note that the argument "*post hoc ergo*," etc., used by Captain Feilden does not appeal to you. That being so why do you accept it when used by him as an indication that he is a very sincere and honest man; but, when the same argument is used by what you call "orthodox medical men" you abuse them by virulent attacks on their honour and integrity, as seen in your numerous writings and occasionally in your speeches, especially when there are no orthodox medical men present to defend themselves.

5th. You say you know nothing about the claims Captain Feilden makes on behalf of his ointment. Precisely. That is, I suppose, the reason why you can say it is not a quack remedy.

6th. No comment.

7th. Your large manuscript books are stated to contain information collected "independently." Are you prepared to state the actual source of this information? By whom and for whom was this independent information collected? From your own statement there is a serious discrepancy between your large manuscript books and Captain Feilden's claims. He claims 500 or 600 cases, you say, but your figures represent 260 cases for him.

8th. Whatever virtue the ointment may possess lies, in your opinion, in the oil! You do not criticize Captain Feilden for making his preposterous claims, some of which were known to you before writing to me, however innocent you may have been up to the moment of reading the BRITISH MEDICAL JOURNAL article. It was never suggested that you should be held responsible for those claims. You evidently think it right that you should deliberately close your eyes to those claims, and though your name has been associated by advertisement with the ointment described by Miss Kidd as a quack remedy, I am not aware that you have hitherto pointed out that Captain Feilden claims to have treated over 300 cases more than your independent information "of practically all the cases of small-pox" shows.

9th. You surely do not wish to suggest that oil in some form was not used in any way during the epidemic except as an ingredient of Captain Feilden's remedy? Does your large manuscript book contain any evidence on this point? According to your view of the virtue in this remedy, the only useful tabulation in this respect would be to divide all the cases into those treated with oil in some form and those not so treated. This, I presume, would place many of your cases not included among Captain Feilden's into the same category as those treated with his remedy, and the alleged fatality-rate would be quite different.

10th. I note you have not found that vaccination exercises any influence whatever upon small-pox. I don't suppose you ever will. He who sees only what he pleases cannot see what is plain.

11th. I am surprised that you do not address your criticism of the conduct of the BRITISH MEDICAL JOURNAL to the Editor. N notice of the criticism of the BRITISH MEDICAL JOURNAL has appeared in the *Jennerian*, and I decline altogether to allow you to make your indirect attack on that journal in the manner you suggest. You know where you can get that kind of thing published. In my view the JOURNAL did not fix upon you a "stigma." The JOURNAL merely noted a stigma that you have put upon yourself, and Miss Kidd's generous effort did nothing, in my opinion, to remove that stigma.

In conclusion, may I point out that my object in writing was to ascertain if you had any particulars of your investigations into the alleged wonderful cures of small-pox by the Crimson Cross Remedies such as I could publish for the benefit of medical officers of health. I think you will agree with me that your letter does not provide me with any such particulars. You surely do not claim that your observations on the "soothing and apparently beneficial effect of oil" are in any way original or such as call for publication. It is very kind of you to have written me at such length, but I should have been more interested if you had been able and willing to write more particularly in regard to the advertised investigations.

I am,
Yours very truly,
ARTHUR DRURY.

HEALTH OF WESTERN AUSTRALIA.

ANNUAL REPORT FOR 1909.

THE annual report for this colony on the public health, etc, for 1909 has recently been issued. The principal medical officer, Dr. James Hope, is also president of the Central Board of Health and chief quarantine officer. The report is a lengthy one, covering 64 pages, and contains a mass of useful information.

Expenditure.

Dealing first with expenditure, the amount spent in the department was £106,540, the medical part of the establishment spending £86,951 and health £14,864.

Medical.

Hospitals are divided into six classes:

1. Hospitals under "The Hospitals Act, 1904"—that is, Perth and Fremantle.

2. Hospitals, Government departmental. They number twenty-eight.

3 Hospitals controlled by local committees and in receipt of a fixed annual grant towards maintenance, in addition to a subsidy in aid of the salary of medical officers. These number eighteen.

4. Hospitals at timber mills. There are three of these. In addition to helping with the salary of district medical officers, the Government contributes a small grant towards the maintenance of indigent patients.

5. One consumptive sanatorium at Coolgardie.

6. A children's hospital which receives a subsidy of £1,250 per annum.

Cost of Treatment.

Taking the whole of the Government hospitals, the cost per patient treated during the year 1909 was £8 17s. 6d, which works out at 7s. 7d. per patient per diem. This sum will compare very favourably with the cost of patients treated in the voluntary hospitals in this country. The number of beds available in the 52 Government hospitals is 1,263.

Vital Statistics.

The mean population of the State in 1909 was 274,755, and in 1908, 268,347, showing an increase of 6,408.

The number of births registered was 7,601, being at the rate of 27.66 per 1,000 population. Illegitimate births showed a percentage of 4.55 on total births.

The deaths numbered 2,706, being at the rate per 1,000 population of 9 84.

The infantile mortality was 78 per 1,000 births.

There were 83 deaths from typhoid, 81 from diphtheria, 188 from phthisis.

A declining birth-rate has to be recorded in this colony; ten years ago the rate was 30 70, last year it was 28 63. The death-rate ten years ago was 13.79; the year under review has been the lowest yet recorded in the history of the colony. The infantile mortality-rate is slightly under that of previous years, it being due to the fact that the care of infants is better understood and their environment improved. Disturbances of the alimentary system, as usual, cause the chief loss.

Enteric Fever.

There were 641 cases notified during 1909, with 83 deaths. The environments of cases indicate that carelessness existed in carrying out reasonable precautions. In some cases the origin is difficult to locate, and whether due to "carriers" or not is uncertain. The whole of the State at present, it may be said, is subject to the "pan" system in closets, and as regards the danger from flies the "pan" is more dangerous than the old dark and deep cesspits. This may account for a number of enteric cases.

Diphtheria.

The number of cases reported was 1,221 with 81 deaths. When no resident medical man was available, antitoxin was administered by the district nurse to each detected case. In many isolated places and where population is scattered, assistance has been rendered by the central health department. One of the medical officers and a qualified nurse from the department has gone and acted with the local medical man, where there is one, or alone in other parts, and carried out complete measures for the control of the outbreak. The measures include examination by swabbing of a large number of the inhabitants. Whenever a clinical case or a carrier was detected the whole household was immediately isolated and kept so until every one was found to show two consecutive negative results. During isolation, treatment by spraying the throat of each affected person was carried out daily by the nurse. All swabs from suspected cases were examined at the health laboratory free.

Phthisis.

The number of deaths reported from this disease was 188. Phthisis is a notifiable disease to the local and central boards of health. Some 1,500 cases were notified as in some stage of the disease. A very important circular was issued by the Central Board of Health to medical practitioners, local authorities, and others on "Suggestions for the Control of Tuberculous Diseases." The Government of Western Australia have recognized the necessity of taking this matter seriously in hand, and are prepared to assist the poor, both as regards necessary comforts as well as places where they can be received. The Government are anxious to do all that is possible to this end, and look to co-operation of all persons and administrative bodies dealing with health matters on the basis of any system that may hold out any reasonable hopes of success. They look to medical men to comply with the Health Act, and notify every case immediately it is discovered. By early notification local health authorities are able to follow up the case.

The sanatorium at Coolgardie contains 63 beds, but it has not been utilized to its full advantage. A great many cases were well advanced, and could receive no possible good from sanatorium treatment, but they were obliged to be received, and thus occupied room which could be more profitably made use of for earlier cases. For the reception of chronic cases the Government are building wards near Perth, where all these cases will be received. Any plans for the treatment of consumptives must necessarily combine the means by which work of a suitable nature can be undertaken under the direction of the medical officer, as this is essential for treatment, and may be made reproductive. In this direction a reserve of about 2,000 acres in the hills is under consideration for future use. It will thus be seen that the Government of Western Australia are sparing no efforts in their desire to combat this disease.

Scarlet Fever.

Three hundred and forty cases were notified; the type was of a mild character, there being no deaths recorded.

Plague.

There has been no outbreak of plague in the Colony since 1906. Precautions, however, continue to be taken by the local authorities in the destruction of rats. In Perth 36,379 baits were put down for the year, 13,202 taken, and 2,232 rats caught. Close investigations of the dead rats are constantly made, and during the year no plague-infected rat has been discovered.

Beri-beri.

One hundred and twenty-nine cases were reported, all from Broome. This town is the head quarters of the pearling industry in the North West, where a large number of boats are annually congregated in this work. This disease is the chief cause of sickness amongst the coloured crews, who are chiefly Japanese, Malays and Manila men. No deaths were reported.

Vaccination.

An attempt was made during the last session of Parliament to remove from the laws compulsory vaccination; it met with the necessary support in the Lower House, but was rejected by the Upper House.

As it is, only about 10 per cent. of those born in the colony in recent years have been vaccinated.

Alcohol.

The report goes into the question of the consumption of alcohol, and, as Dr. Hope says, "continues to show an enormous waste of money by putting into the mouth that which takes away the senses of the brain."

During last year the amount expended on alcohol per head was £8 3s. 6½d. In comparison with other States and England as regards consumption per year per head, Western Australia comes out badly, as the following table shows:

	Gallons.
Western Australia:	
Spirits	1.49
Wines	1.08
Beer	24.74
New Zealand:	
Spirits	0.785
Wines	0.144
Beer	9.309
Victoria:	
Spirits	0.70
Wines	0.85
Beer	12.04
United Kingdom:	
Spirits	1.17
Wines	0 66
Beer	24.74

Milk Supply.

In 1908 the Central Board inaugurated the veterinary examination of dairy cows, and this was carried out by the Board with satisfactory results.

The inspection of dairy premises, as well as the milk supplied to customers, is undertaken by the inspecting staff of the Central Board.

Sanitation.

There is no system of sewerage anywhere, but one is in course of construction in Perth and Fremantle, which will take a considerable time yet before it is completed. As already mentioned, the "pan" system is at present in vogue. The system for disposal is by trenches, and this is where default is often made, both in the trenches being too large and too deep and in care not being exercised in covering up deposits as soon as laid in. A few private houses and some institutions are providing themselves with septic tanks, with satisfactory results.

Sanitary Supervision.

A staff of men who hold certificates of the Sanitary Institute are employed, who itinerate the whole of the chiefly settled parts of the State, including the goldfields. They inspect all buildings, schools, dairies, slaughterhouses, etc., and report defects found. The Central Board issues notices to remedy any defects, and, if not complied with, prosecution follows.

Laboratory.

A well-equipped laboratory is attached to the Central Board of Health, where all bacteriological investigations are made, both on behalf of the Board and private practitioners for diagnostic purposes. For diphtheria 8,841 swabs were examined, and for different forms of tuberculosis 230 specimens were examined.

School Hygiene.

The examination of school children has received attention for some years in this State. The system that has been followed has been that whenever it has been found possible a visit has been made to a school by the medical officer, or whenever for other reasons schools have been visited, the teacher has been asked to bring up all children who appear to him to be suffering from any physical defect or bodily ailments. Whenever defects are observed a notice is sent to the parents calling their attention to the necessity of obtaining treatment for defects. Lectures are given in school hygiene to the teachers.

General Remarks.

The medical officer concludes this very excellent report by a few general remarks. He states that the general conditions of people's lives in the colony are of the best—good climate, plenty of sunlight, food, and satisfactory employment—so as to prevent anything likely to be a cause of deterioration of the race. In many parts of the State there exists a combination amongst men, apart from benefit societies, which provides for medical treatment and assistance during sickness. The fuller development in the way of preventing invalidity, providing insurance against accidents and old age, is one which should be undertaken by employers and employees, supplemented by State aid. It will thus be seen that those responsible for the well-being of the people are working on much the same lines as we are on this side for providing State medical aid.

One seldom peruses a report in which there is so much evidence of good work done in all branches of public health. The medical officer is anxious to see the different Health Acts consolidated in one bill, which would include a registration board for midwives and nurses, examination of school children, etc. This bill, it is to be hoped, will be taken up at an early date by the Legislative Assembly.

THE AUTOMOBILE EXHIBITION.

The exhibition annually organized by the Society of Motor Manufacturers and Traders has been in full progress at Olympia during the past week. The doors opened on Friday, November 4th, and will not be closed until 10 p.m. on Saturday, November 12th. This year the usual annual dinner was not held, anything in the form of an opening ceremony having been abandoned as a mark of respect to the President of the Royal Automobile Club, the late Prince Francis of Teck.

The exhibition includes over 300 separate stands, of which just one short of 150 are given up to naked chassis and to cars ready for the road. The sets of cars on each stand average between five and six, and occupy the whole of the ground floor of Olympia and its annexes, which now, to all intents and purposes, form one single hall. The gallery, as usual, is given up to components and accessories, many of the stands being shared by several firms. Hence the total number of manufacturers represented is very large indeed.

The aggregate value of the exhibits has been estimated at little short of a million pounds; a more accurate figure would probably be half that sum; but in any case the exhibition must be written down as the largest automobile show ever held either at Olympia or in Paris. The increased size would appear to be due to skill in making full use of the available space which exhibitors and the administration have alike acquired from the experience of the past few years.

A further outcome of such experience is that it has been made more possible than in some previous years to obtain accurate information at the stands as to the cars shown, more especially in respect of technical detail. In addition, a good many exhibitors have secured in different parts of the building small offices, and have thus put themselves in

a position both to transact business and to supply information free from the turmoil of the stands. For these and other reasons the exhibition this year is less bewildering and more informing to such visitors as without expert assistance come with a view to choosing a car, or, at least, deciding on the type of car which they will eventually select.

General Impressions.

No attempt can be made to give a description of the exhibition as a whole, but attention can be drawn to such of the cars and appliances shown as seem best calculated to repay examination by medical men and an account given of the general impressions created.

As regards the latter, it is of a kind agreeable to those who, like most of our readers, purchase and use cars mainly for business purposes. The tendency of the day among motor manufacturers, as illustrated by the cars now on view, is decidedly favourable to this class. There are cars, of course, of all prices, but the characteristic of the exhibition is the predominance of the car of moderate price and moderate power. Certain firms which hitherto have catered solely for those who like what may be called State coaches and racing machines, and are prepared to pay for them, are now making vehicles of quite moderate price and of horse-power as low as 15-20.

Whether the prices of automobiles as a whole are lower is another question. There is some evidence of shrinkage, but, on the whole, the price of a good car may be regarded as much what it was about a year ago. On the other hand, the car of 1911—that is to say, the car shown at this exhibition—seems certainly to represent better value for money. Each separate manufacturer seems to be picking out the points of proved desirability in his rival's productions and to be adopting them in the manufacture of his own cars. The result is that cars purchased now are, price for price, likely to prove more comfortable, reliable, and satisfactory purchases than the average car of an earlier date; a further result is a tendency towards a common type. This in itself is an advantage, as it makes the task of choosing a satisfactory car less worrying and difficult.

This, of course, does not mean that anything like a standard car is yet available. There are still far too many points of essential principle of car construction to be determined. Meanwhile the battle of the valves continues; the sliding sleeve, the Knight patent, the merits of which we described last year, is making progress, and is to be found on a good many cars besides those of the Daimler firm.

But this by no means represents the sole attempt at increased silence of movement. Most cars nowadays are practically noiseless as compared with their predecessors, thanks to enclosure of working parts and other improvements, and several firms are now endeavouring with success to eliminate the noise due to poppet valves by increasing their area, and thus diminish the distance through which they must rise and fall.

As regards transmission of power to the driving wheels, chains and bands are becoming more and more rare, their use being practically confined to quite small runabouts and very heavy vehicles. For the rest, the use of live axle transmission is almost universal; but here, too, there is a fight going on.

As at the time when the live axle was first introduced, the majority of makers still use a crown wheel on the bevel principle, but an increasing number are adopting a worm drive—that is, one in which the propeller shaft ends in a worm which transmits the power to the rear axle through a master wheel around it. The majority, perhaps, of these use it on the lighter and lower-powered cars, but a good many are using it for cars of all weights.

Should the worm drive gain the day, there will still remain a final question for settlement; this is whether the worm should lie above or below the master wheel. The importance of this difference lies in the fact that when the latter plan is adopted, engines and all transmitting gears must be set on the slope.

In respect of cylinders, it should be mentioned that many firms are giving the piston a longer stroke, and thus securing greater power without increasing the nominal rating of the engine. Hitherto short stroke engines have been preferred, as producing less vibration, and rendering it easier to secure a large number of revolutions per minute, which, of course, means added flexibility. The new taxation, however, seems to have caused the possibilities of long stroke pistons to be further investigated with the results that seemingly the long stroke engine as now produced is free from the defect of causing vibration, and can be run at high speed. The rate at which an ordinarily good engine will run as compared with those of earlier date is certainly remarkable. Only four or five years ago a thousand or more turns of the crank shaft was considered good. From a good engine practically double that number can now commonly be extracted. This fact to some extent discounts the advantages of multiple cylinders, which are now supplied by many firms as part of quite low-priced under parts. It is, indeed, by no means certain that the day of the single cylinder is entirely over.

Further points noticed were an increase in the number of gear boxes entirely covered in, but made easy of inspection by substituting for a metal top a sheet of thick glass; and that the Liversedge front-wheel brake, which we described some two years ago, is more than holding its own; it is to be seen on many cars. A description of its advantages will be found in vol. ii, 1908, p 1564. Self-starting appliances are also increasing in number, and some of them seem of a practical character. To the man who drives his own car a really efficient self-starter, or even a device which materially lessens the amount of force required to turn the crank, is of immense advantage. There is also a change in the number of gears which are supplied. A fourth gear, inserted between the present second and third, is now to be found on many cars. Whether it will prove a popular notion remains to be seen. Too large a choice is sometimes embarrassing, and with a flexible engine most drivers already appear able to vary their speed within the limits of the power of their car quite as much as it is necessary for threading traffic and dealing with variations of elevation in the road.

In regard to coach-builder's work, this is certainly improving all round. The plan of fitting doors so that they open forwards instead of backwards is spreading, and represents a decided improvement, for it eliminates the danger of a person getting into a car being knocked down by the door if the vehicle makes a sudden and unexpected move. Another improvement which we noted for the first time last year is now to be found on practically all cars; this is the plan of enclosing by a door the driver's as well as the back seats, even on cars of touring pattern. It increases the comfort of those on the front seats, and also improves the appearance of the carriage as a whole. A further point to which attention has been successfully paid is accessibility of the driving seat from either side.

The use of wire instead of wooden wheels also appears to be growing in favour. As for tyres, there are a good many new claimants for notice, and the well known firms have plenty of minor modifications in construction to show. Only one thoroughly novel idea, however, was noted; this is a tyre with its cover built in removable sections. It constitutes a new departure, not only on this account, but because nearly all attempts to remove the disadvantages of pneumatics have lain either in thickening or otherwise strengthening the outer tube, or in so far interfering with the inner tube as practically to deprive it of its character of an air tube altogether.

Of this new sectional device, which leaves the inner tube untouched, we hope to give some account at a later date and at the same time to illustrate all the other points mentioned in the course of this article by description of specific cars into which these various improvements have been introduced.

SCIENCE NOTES.

A QUARTZ balance, of which the sensitiveness exceeds the half-millionth of a milligram (the thirty-millionth of a grain) was used by Sir William Ramsay and R. W. Gray to estimate the density of the radium emanation. The volume of the emanation which they employed had been previously calculated from the value found for the volume in equilibrium with 1 gram of radium. This was introduced into a small capillary tube, which was then sealed and placed on the balance. Its weight being determined, the tip of the capillary tube was broken and

the weight again read. From this the weight of the emanation was found to be about a two-thousandth of a milligram, and the density calculated from this gave molecular weights of from 216 to 228, the mean of five estimations being 220. This shows, therefore, that the true atomic weight is 222·5, this being deduced from the disintegration theory, the atomic weight of radium itself being 226.5, and that of helium, expelled as α-particles, being 4. The name *niton* is proposed for the radium emanation as being one of the inactive gases, taking its place in the series after *xenon*. An account of this interesting investigation is published in a recent number of the *Comptes rendus*.

A hospital for fishes seems a striking enough novelty in its way, and the ingenious idea, needless to say, comes from America. Such an establishment has been set up at the New York Aquarium, and already a considerable number of finny patients have been attended to with an encouraging measure of success. The scope of treatment is naturally somewhat limited, and many of the diseases dealt with necessitate treatment of a very empirical kind, yet it would be too much to expect the piscine healing art to attain perfection from the very start. So far as we know, the diseases to which fish, especially fresh-water fish, are most liable are of a parasitic, protozoal, or fungal nature. These attack the skin and frequently give rise to extensive epizootics. Treatment of these cases is being attempted by the application of formalin and other antiseptics, as well as by the gradual change from fresh to salt water for a few days, which not infrequently kills off the parasite without doing much injury to the fish. Deformities and injuries are common enough, and these cases do surprisingly well under the skilful surgeon's hands. Tumours, benign and malignant, are of frequent occurrence amongst fishes, but they have not lent themselves as yet to operation. We have even seen a case, *post mortem*, of chronic pericarditis with cardiac hypertrophy in a fish, but there was unfortunately no previous record of the clinical signs and symptoms. It is not too much to believe, indeed, that fish are subject to the same ills as human flesh is heir to, and in spite of their undemonstrative nature, there is no reason why we should not be able, if need be, to render them medical assistance in the same way as we do horses, dogs, and other animals which have come, voluntarily or otherwise, under man's fostering care.

LITERARY NOTES.

A REPRINT has just been published, in pamphlet form, of Sir John Byers's most interesting account of *Ulster Ambassadors to China*,[1] which first appeared in the *Northern Whig* for September 28th, 1910, on the occasion of the freedom of the city of Belfast being conferred upon Sir John Jordan, K.C.B. Sir John Jordan is the third British Ambassador to China who has hailed from the North of Ireland, and this little pamphlet contains a brief sketch of the career of each of the three great Ulstermen—Macartney of Dervock, Sir Henry Pottinger, and Sir John Newell Jordan—who in the course of the last 120 years have represented Great Britain at the Court of Peking. Of these, Macartney, who was entrusted with the embassy in 1792, was the first man ever sent as Ambassador from England to China. It is interesting to learn that this able diplomat probably owed some of his many gifts to heredity, his great grandfather, "Black George Macartney," having been a most remarkable and enlightened man, whom Sir John Byers does not hesitate to characterize as "the first great public health reformer in Belfast," and one who as early as the year 1678 "foresaw what a vehicle a defiled water supply would become in the propagation of disease." "Black George Macartney" was of Scottish descent, but left his native land to settle in Belfast somewhere about the middle of the seventeenth century. He seems to have been a prosperous person, for besides possessing a large business as a merchant, he was a miller, sugar refiner, collector of customs, shipowner, and possibly a worker in woollens, and he rose to be chief magistrate, or sovereign, as it was then called, of Belfast, a post which he occupied for many years. It was during his tenure of this office that he endeavoured to improve the water supply of the city, which was in sore need of attention and improvement, if the following description, taken from a proclamation issued by Macartney on July 29th, 1678, is accurate: "The River which runneth through the Town is very much defiled and abused by all manner of sinks falling into it and other nuisances corrupting the same, whereby the water is made altogether unfit for the use of man in meat and drink." Thanks to his efforts, "Belfast got its earliest supply of 'good and wholesome water' carried in wooden pipes (there is one now in the Belfast Museum) underground from the Upper or Tuck Mill Dam through Lettice Hill to the Great Bridge of the town." Small wonder that Benn, in his *History of Belfast*, describes this enterprising Scot as a man of whom "it may be said, without exaggeration, that at no period has the town contained a citizen of more ability," and that "there was no project for the public advantage of which he was not the originator or promoter." The life of any man who has spent his life in the service of his native land must always be of interest to his fellow-countrymen, and the lives of these "Ulster Ambassadors" are no exception to the general rule. Moreover, they possess an additional advantage from the clear and forcible style in which they are here related, and Sir John Byers is to be congratulated upon a very interesting and well-written memoir.

[1] *Ulster Ambassadors to China: Macartney, Pottinger, Jordan.* By Sir John Byers. Reprinted from the *Northern Whig* of September 28th, 1910.

Dr. John Arbuthnot was not only the most learned, but, in the opinion of many, the wittiest of the "Wits of Queen Anne." To him we owe almost the whole of the *Memoirs of the Extraordinary Life, Works, and Discoveries of Martinus Scriblerus*, which was intended to be a joint production of the members of the Scriblerus Club, of which Pope, Swift, Gay, and others, as well as Arbuthnot, were members. Only the first book is extant, and that was not published till 1741, six years after Arbuthnot's death. Scriblerus, it may be remembered, studied anatomy and medicine, and he may, perhaps, be accounted a pioneer of the open-air treatment. At any rate, it is said of him in Chapter XIV that

> His was also the device to relieve consumptive or asthmatic persons by bringing fresh air out of the country to town, by pipes of the nature of the recipients of air pumps.

But he went further than this, as his pipes were designed

> To introduce the native air of a man's country into any other in which he should travel with a seasonable intromission of such steams as were most familiar to him, to the inexpressible comfort of many Scotsmen, Laplanders, and white bears.

That Arbuthnot intended to make Martin a target for his ridicule of medical pedantry is shown by a letter of his to Swift dated June 26th, 1714, and published in Swift's *Letters* (with notes explanatory and historical by John Hawkesworth, London, MDCCLXVI). He writes:

> . . . Pray remember *Martin*, who is an innocent fellow, and will not disturb your solitude. The ridicule of medicine is so copious a subject, that I must only here and there touch it. I have made him study physic from the apothecary's bill, where there is a good plentiful field for a satyr upon the present practice.
>
> One of his projects was, by a stamp upon blistering plaisters and meliot by the yard, to raise money for the government, and to give it to *Ratcliffe* and others to farm.
>
> But there was like to be a petition from the inhabitants of *London and Westminster*, who had no mind to be flead. There was a problem about the doses of purging medicines published four years ago, showing, that they ought to be in proportion to the bulk of the patient. From thence *Martin* endeavours to determine the question about the weight of the ancient men, by the doses of physic that were given them. One of his best inventions was a map of the three cavities of the body, and one for the external parts; just like the four quarters of the world. Then the great diseases are like capital cities, with their symptoms all like streets and suburbs, with the roads that lead to other diseases. It is thicker set with towns than any *Flanders* map you ever saw. *Ratcliffe* is painted at the corner of the map, contending for the universal empire of this world, and the rest of the physicians opposing his ambitious designs, with a project of a treaty of partition to settle peace.
>
> There is an excellent subject of ridicule from some of the *German* physicians, who set up a sensitive soul as a sort of a first minister to the rational. *Helmont* calls him *Archoeus*. *Dolaeus* calls him *Microcosmetor*. He has under him several other genii, that reside in the particular parts of the body, particularly prince *Cardimelech* in the heart; *Gasteronax* in the stomach; and the *Plastick* prince in the organs of generation. I believe I could make you laugh at the explication of distempers from the wars and alliances of those princes; and how the first minister gets the better of his mistress *Anima Rationalis*.

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HUMAN FACTORIES OF DISEASE.

SARCASMS to the effect that medical men and modistes have a mistress in common are frequently launched at the medical profession, and are received with indifference. We know that Queen Fashion, who is thought to rule our treatment, is in our case an optical delusion, so to speak—a simulacrum created by the circumstance that when some new method seems to have proved of value in particular instances, there is a laudable readiness on the part of medical men to see if it cannot be applied to the advantage of their own patients; and this, of course, commonly leads to a good deal about the treatment being suddenly heard by the public.

If this verbal javelin is somewhat blunt when hurled at therapeutists, it is absolutely pointless when aimed, as it sometimes is, at pathology. In this branch of medicine certain views have at times tended to attain undue prominence; but this almost always has been when new discoveries in the mother science, Physiology, have seemed for the moment to disturb the foundations of all existing pathological beliefs. On the whole, pathology might almost be said to have pursued an unswerving course from the beginning of the history of medicine, the continuity being mainly obscured by the introduction of new methods and improvements in technique.

As the term is now understood, pathology is commonly, and to some extent rightly, regarded as an entirely modern development of medical science, but there have been clinical pathologists from the very beginning, and the accuracy of many of their conclusions, though not of their reasoning, is from time to time curiously confirmed by modern research.

Much the same considerations apply to epidemiology, which, in essence, is merely a branch of pathology, and was in effect treated as such by the Section of Bacteriology, of part of whose proceedings at the recent Annual Meeting an account appears in the earlier pages of this issue. The rest of its proceedings were conducted in conjunction with the Section of Pathology, and appeared in the issue of November 5th, when the more practical lessons to be derived were brought out in a leading article concerning complement deviation in diagnosis. The subject to which we now wish to draw attention is recently acquired knowledge of the bionomics of pathogenic organisms and its bearing on epidemiology. A hasty reading of Dr. Houston's admirable summary of this question might conceivably leave an impression that sanitation had hitherto been following wrong lines, and that the time had come to transfer many existing beliefs to the lumber chamber of scientific ideas, and to send to the scrap heap much of the present machinery of sanitation.

This, of course, is not really the case. The general principles of disease prevention remain unchanged, and Dr. Houston's account of matters merely indicates ways in which the net around disease-bearing organisms could be drawn more tightly and the efforts to prevent them playing their wonted part be concentrated. To sum up his article, he shows that so far as are concerned dead, or rather lifeless, transmitters of disease, vigilance may in some degree be relaxed, while it must be increased in respect of living storehouses or factories of disease, including in that term both insect and animal life. Pathogenic organisms, with one or two exceptions, are almost entirely dependent on the living for continued life, and attention to the living transmitters of disease—the need for which, except so far as are concerned actual sufferers from zymotic disorders, only began to be recognized within recent times—must now be increased.

Hitherto it has been necessary to attack the causes of disease with a blunderbuss or scatter-gun, and this has doubtless led, as Dr. Houston would seem to suggest, to the spending of more time and money than need be on the purification of impure substances, on the protection of pure materials from contamination, and on the avoidance of dangerous surroundings. Now that so much more is known as to the precise way in which a very large proportion of all disease is introduced into the human body, it is not difficult to give a practically affirmative reply to Dr. Houston's question. This is whether all lifeless disease agencies, such as impure soil, air, water, and food, would not cease to be operative, if it were possible to exclude from our environment all the living creatures who, from one cause or another, keep stored in their bodies germs which are infective to others.

At the same time this is a somewhat academic admission, for though it might, and in many cases does, prove possible to deal with insect and other like living transmitters of disease, we now have some idea of the large part that human beings themselves play in distributing disease from person to person; as Dr. Houston himself suggests, it at present seems practically impossible to negative entirely the part which these, unintentionally, unwillingly, and usually unconsciously, at present play.

But how well worth while is pursuance of this subject is clearly evidenced, not merely by Dr. Houston's paper, but by those which were subsequently read. Particularly informing in this respect is the account given by Professor Lentz of Berlin with regard to the typhoid campaign carried on in Germany during the last few years; while other papers on diphtheria, dysentery, and other disease carriers all afford corresponding lessons.

Independently of the increased light it throws on the part played by carrier cases of typhoid, the paper of Dr. Lentz has the added value that it reminds us of certain points in the pathology of typhoid which are of much interest and some clinical importance. One is that the intestinal lymphatics, though the commonest portal of entry for the bacilli, are not the only one; the tonsils seem sometimes responsible. Hence cases of sore throat in epidemic times should receive attention. Then again, the actual seat of multiplication of typhoid bacilli is not the intestine; their predominance in this quarter is due to the fact that they are poured into it with the bile. The cavity of the intestine, indeed, is their death-bed rather than their home.

When, too, one remembers the disinclination of

physicians of fifty years ago to recognize typhoid fever as a disease absolutely distinct from all other febrile disorders, or to accept the clinical picture drawn of it, it is specially interesting to observe that the investigations carried on during this campaign prove conclusively that textbook pictures of an attack of typhoid fever only apply to pronounced cases. It has always been recognized, of course, that attacks of typhoid fever vary greatly in their severity, and as an explanation of the frequency with which visitors to some foreign countries contract typhoid fever as compared with the natives it has been suggested that the latter go through typhoid so commonly in early life that the adult population is practically immune.

The probable truth of this is indicated by the frequent identification during the campaign—by the Widal reaction and other means—of cases of typhoid fever in persons of all ages, including young children, many of whom were only slightly unwell, while others, though actually excreting typhoid bacilli, exhibited no symptom calculated to attract attention. There seems reason, indeed, to believe that such larval cases may be sufficiently common to account for the fact that when recognized cases of infection by typhoid carriers occur the victims are commonly newcomers, not ordinary members of the household. Another conclusion to be drawn from the prolonged investigations recorded is that the great majority of all typhoid carriers are women.

Apparently the time for which a person may remain a typhoid carrier is quite unlimited, but this, according to the researches of Drs. J. A. Arkwright and G. H. K. Macalister respectively, is fortunately not true of another very important class of unconscious disease-spreaders, namely, diphtheria carriers, nor yet of dysentery. Nevertheless, the vista of work opened up for sanitarians is formidable, for the number of diseases now known to give rise to carrier cases is considerable, including, as it does, typhoid fever, diphtheria, dysentery, cerebro-spinal fever, and cholera, apart from diseases such as tubercle, which, for many reasons, clinical and pathological, should be included in the class; and before long others may have to be added.

We can point, however, to one circumstance which at the present moment is decidedly consoling—this is that plague carriers are not only unknown to exist among human beings, but there is strong reason for accepting Dr. Petrie's suggestion that they do not exist. Another fact which we mentioned last week, but which may well be emphasized, is that plague is not infectious; in other words, there is no very special risk in being in contact with a case of human plague of the ordinary bubonic variety. This is not equally true of cases of pneumonic plague, or plague septicaemia, such as those at Freston (of which two interesting accounts in detail appear in the earlier pages of this issue), for the bacilli-laden expectoration renders infection from person to person easy unless due precautions are taken. But pneumonic cases are exceptional, and are merely an accidental clinical variety, not a separate form of the disease.

The vast majority of cases of human plague are due to each separate victim having been bitten by a rat-flea, and if rats can be excluded from houses and public places the battle is practically won. This is the point of primary importance, for attempts to exterminate rats are never more than partially and temporarily successful. Not only are rats exceedingly fecund, but they show a more than human degree of common sense in attending to their own interests. Proverbially they leave a sinking ship, and when they find themselves subject to epizootic disease, or to determined attacks by human or other foes, they promptly scatter in all directions and look for more comfortable quarters.

For this reason alone the suggestion recently put forward in the *Times* by Mr. A. E. Shipley, to the effect that a cordon should be drawn round the infected zone in Suffolk, and even a wire fence erected, is distinctly unpromising. Such zone must already be something like thirty miles in circumference, and long before the precise amount of wire fencing required to surround the area could be secured and erected, the plague among rats, if it had not already died out of its own accord, would have spread far and wide. In short, any campaign against rats carried on mainly with a view to lessening the probability of plague establishing itself among human beings in these islands must, as we indicated last week, be carried on throughout the whole country, and not in Suffolk alone.

When all is said and done, the chances of anything like a severe outbreak of plague are very small. Even Turkey some ten years ago, when the disease was much less well understood than it now is, managed to free itself of plague in the course of a few months, and without any material loss of life; and what Turkey can do, Great Britain may surely expect to be able to do likewise.

SCIENCE AND ART.

It is customary, we believe, in artistic circles to exalt Art at the expense of her younger sister, Science, claiming for the former the supreme place among the ideal functions and vocations of mankind. Men of science are as a rule content to do their work in silence, without troubling themselves in the least about the relative worth of their own and other men's tasks, or the esteem in which they are held by the world. The question may indeed be considered academic by some, but it has its importance, nevertheless, even from the practical point of view. It resolves itself into the question whether Beauty and Truth are essentially or only seemingly distinct ends, and, if the former, to which the higher devotion is due. To us it appears probable that Art and Science have much more in common than is generally supposed, that the very same faculties which at an early stage of development find inevitable expression in aesthetic pursuits will in their fuller maturity be drawn into the service of Science. This process of transition has often been exemplified in the lives of great men. Spinoza and Newton were devoted to drawing and painting in their youth. Goethe, on the other hand, as he grew towards middle age, developed an unmistakable interest in scientific investigations, and made some discoveries of real importance. Of his now discredited theory of colour he professed himself prouder than of all his poems and plays. The typical instance of transition from art to science is, however, that of Leonardo da Vinci. Of his aesthetic endowment there can be no manner of doubt; he is universally acclaimed as among the very few supreme artists of the world. Yet the older he grew the more definitely his devotion to art became transformed into devotion to science. His notebooks reveal an incredible catholicity of interest

and an amazing prescience with regard to the destined results of inductive research. He was an anatomist of the first rank, and is held by some to have anticipated the revolutionary discoveries of Vesalius. He was perhaps the first to grasp firmly the principle of success in aviation in so far as he insisted that it must be based on study of the flight of birds. He is known to have constructed a flying machine of some sort, but whether or not it flew we are unable to say. Returning to the question of the general relation of art and science, we will quote some significant remarks of Gustave Flaubert as bearing out our own view of the matter. "The time of the beautiful is passed. Humanity, free to return to it, has nothing for the present quarter of an hour to do with it. The further it goes the more scientific will art become, and in the same way science will be more artistic: the two, after having been separated at the base, will meet at the summit." The fact that Flaubert's father was a distinguished surgeon and his mother the daughter of a country doctor, may partly account for his appreciation of science and the strongly-marked realism of his novels. But there can be no doubt that in the opinion just quoted he was typical of the best modern representatives of the art he himself practised with supreme skill. The best modern fiction is that which is most obviously based on actual observation, and in which plot and invention play an altogether subsidiary part. Psychological interest is so universally predominant that it is hardly an exaggeration to say that the aim is as much scientific as aesthetic.

Sociologically, it is of course the fact that aesthetic development precedes and is gradually superseded by regard to those utilitarian requirements over which science presides. The ships of our Scandinavian ancestors, with their gaily-striped sails and the carved dragons' heads at their prows, must have been picturesque objects, but there is reason to suppose that from the points of view of comfort and health they left everything to be desired. And as much could certainly be said of the beautiful houses which in our own ancient boroughs and in cities like Munich and Heidelberg survive as monuments of mediaeval architecture. The modern idea, whether consciously formulated or not, would seem to be that in construction function shall determine form, and it is a quite arguable position that the successful achievement of this aim results in beauty of a higher kind than the primitive preoccupation with form to the neglect of utility can attain. A modern locomotive, yacht, or battleship, each by the perfection of its adaptation to the end in view, makes a distinct aesthetic appeal. But perhaps the best example of that merging of the scientific and aesthetic methods referred to by Flaubert is furnished by the spectacle of a precarious and skilful surgical operation. The sense of restrained power, of exact knowledge, of the perfect co-operation of various minds in one function of purposeful activity, the smooth silent precision of all parties concerned, above all, the ever-present sense of deep and poignant significance and gravely-realized responsibility, are calculated to evoke in the mind of an appreciative onlooker an emotional thrill or exaltation analogous to that awakened by the contemplation of a great work of art.

It is no doubt the case that, as Weininger pointed out, artists have always enjoyed a certain advantage over men of science in respect of the full expression of temperament and personality. The triumph of the scientific discoverer culminates in the formulation of a law which at once takes its place in that great system of objective truths which constitutes science. The greater the discovery the more inevitable it will appear—that is, the more impersonal, the freer from any traces of the idiosyncrasy of the discoverer. Such has, at any rate, been the case with the great discoveries of the past; but it does not follow that it will always be so. The dominant science of to-morrow will be psychology (using that word in its most inclusive sense as the science of human nature), and it may well prove that the greatest achievements in this field will fall to the lot of those who bring to the work, not merely the detached intellect of the man of science, but also the keen intuition and the sympathetic temperament of the artist. "Individuality is founded in feeling," wrote the late Professor James; "and the recesses of feeling . . . are the only places in the world in which we catch real fact in the making." And, this being so, he conceives that "the rigorously impersonal view of science might one day appear as having been a temporarily useful eccentricity rather than the definitively triumphant position which the sectarian scientist at present so confidently announces it to be."[1] Such a reversion of science (mediated by psychology) to the more personal style and method, which, after all, prevailed up to the time of the Renaissance, may ultimately reveal the underlying unity or continuity of the aesthetic and scientific aspirations.

In reviewing the history of the Renaissance one cannot but notice the fact that it begins as an aesthetic and gradually merges into an intellectual revival. The great names of the latter part of the fifteenth century, when Lorenzo de' Medici reigned at Florence, and of the first half of the sixteenth—Perugino, Da Vinci, Dürer, Michael Angelo, Titian, Raphael, Holbein—are the names of artists. Copernicus was born in 1473 and died in 1543; and then, after a pause, we are met by a galaxy of names famous in the spheres of philosophy and science—Bacon, Tycho Brahe, Kepler, Galileo, Harvey, Hobbes, Descartes, Spinoza, Locke, Leibnitz, Newton—dominating the whole of the seventeenth and the opening of the eighteenth centuries. This may not suffice to prove, but certainly suggests, the truth of our contention that in relation to science the aesthetic enterprise plays a provisional, or at any rate, a preparatory, rôle.

Coleridge defined genius—no doubt that of the aesthetic type was foremost in his mind—as the carrying on of the freshness and feeling of childhood into the powers of manhood. Without the least desire to be offensive, we believe that all impartial observers will admit that a certain immaturity denotes the personality of the typical artist in comparison with that of the typical man of science. Yet if Keats was justified in his assertion that "Beauty is truth, truth beauty," both are engaged in the same quest, and their characteristics as well as their functions must converge. And if Professor James's prediction of the transiency of the "impersonal view" of science should prove correct, it is more than likely that the medical profession, whose duties have always been a safeguard against emotional atrophy, may contribute largely to the result. Many of our great physicians and surgeons have been remarkable not merely fo intellectual or practical ability, but for somethin closely resembling temperamental genius.

[1] *The Varieties of Religious Experience*, p. 501.

TUBERCULOSIS STATISTICS.

PROFESSOR B. FRÄNKEL gives some abstracts from the recent statistical return of the German Reichsversicherungsamt.[1] These have been published in the second volume of the *Medizinalstatistischen Nachrichten* in observance to an order of the Minister of Education of the Royal Prussian Statistical Board. The figures showed a marked improvement as compared with the figures published for the preceding year (1908). The mortality from tuberculosis per 10,000 living was 15.59 for 1909, and 16 46 for 1908. It was 32.51 in 1878. The results of institutional treatment of tuberculosis are discussed. In 1909, 102,762 persons were treated in institutions, as against 95,130 in 1908, and 11,672 in 1877; 12,915 of the 102,762 died. The increase of cases treated in institutes is due to the generalization of sanatoriums. Fränkel regards the death-rate in the institutions as satisfactory when compared with previous returns. He then turns to the effect of treatment. Here the figures permit of comparison by taking the results five years after the beginning of the treatment. In 1897 only 27 per cent. of the patients showed "permanent results," by which it appears that he means "considerably improved or practically cured." In 1893 this figure rose to 31 per cent., in 1901 to 34 per cent., in 1904 to 42 per cent., and in 1905 to 46 per cent. "These excellent results are chiefly due to the sanatoriums," he states. He appends a table of the condition of the patients who were still able to work five years after the treatment was begun. The numbers are set up in the columns representing the stages of disease: 0 = practically no physical signs, I = Turban-Gerhardt's first stage, II, III = Turban-Gerhardt's second and third stage respectively. From this table it appears that of 29,029 male and female patients (they are given separately in the table) 897 lost all physical signs at the end of the five years—that is, 3 09 per cent. of those patients who had recovered sufficiently to work again were apparently cured! Furthermore it is seen that only 13.44 per cent. of those included in the table were so far improved as to be promoted to a higher stage or column. We hear a great deal of the reputed 50 per cent. of cures in tuberculosis, and even if full allowance be made for the fact that the cases included in these statistics are largely made up of the working-class patients who can be kept in the sanatorium only for a short time, it must be clear that the actual number of consumptives who are cured is still deplorably small. Professor Fränkel speaks of a hope being justified that the younger members of the profession will live to experience a time when tuberculosis will have lost its importance as a scourge. If this is to be consummated, then the rate of progress must be materially accelerated, for a broad abyss divides a time when less—far less—than 3 per cent. of those treated regain their complete health from one when tuberculosis will be so mild a complaint as no longer to form a national scourge.

AN ACTUARIAL STUDY OF PULMONARY TUBERCULOSIS.

TWO professional actuaries—Messrs. W. P. Elderton and S. J. Perry—have recently published[2] an analysis of data relating to the influence of sanatoriums on the expectation of life of phthisical subjects. The material used was collected by Dr. Noel Bardswell in this country, and by Drs. Lawrason Brown and Pope in America; the figures are analysed, and the expectation of life for persons of the given ages, calculated from the Registrar-General's English Life Table, compared with the actual experience. As the authors remark, the results need confirmation in the light of fuller statistics, but, so far as they go, it would appear that even in the cases in which treatment has been most successful those who have suffered from tuberculous disease are subject in after-life to a heavier rate of mortality than the general population. A most instructive comparison is instituted between the results of sanatorium treatment and the earlier records of Pollock and Williams; the difficulties in the way of effecting such a comparison are carefully noted, but the result of the analysis fails to reveal any superiority in the sanatorium results. There does not appear to be sufficient justification for the opinion so often expressed that sanatorium treatment has materially increased the expectation of life of phthisical persons. While we are strongly of opinion that the time has not come for final judgement on this important matter, Messrs. Elderton and Perry's memoir appears to us to be a careful piece of work, executed in a spirit of true scientific modesty and caution. Whatever may be the final conclusion of the matter, we cannot but feel that many readers of this paper and of a recent correspondence in our columns will regret that a somewhat higher standard of statistical reasoning has not been adopted in certain contributions to the literature of tuberculosis.

[1] *Berl. klin. Woch.*, October 24th, 1910.

[2] *A Third Study of the Statistics of Pulmonary Tuberculosis: The Mortality of the Tuberculous and Sanatorium Treatment.* By W. Palin Elderton, F.I.A., and S. J. Perry, A.I.A. London: Dulau and Co. 1910. (Pp. 35. 3s.)

THE CONTROL OF BOVINE TUBERCULOSIS.

AT its meeting in Chicago in September, 1909, the American Veterinary Medical Association appointed a committee of American and Canadian gentlemen to consider and advise upon methods for controlling bovine tuberculosis. This committee, which styles itself "The International Commission on the Control of Bovine Tuberculosis," held four meetings during 1909 and 1910, and has now issued its report. The Commission strongly urges the wide application of the tuberculin test, declaring that this "is the fundamental factor in any policy having for its object the control of bovine tuberculosis." Tuberculin, when properly used, is an accurate and reliable diagnostic agent for the detection of active tuberculosis. As regards different methods of applying the test, they find that subcutaneous inoculation is the only one which can be recommended for use on cattle at the present time. The Commission advises the passage of legislation providing for the compulsory notification by owners and by veterinarians of the existence of tuberculosis in a herd, whether the disease be revealed by the detection of clinical cases or by the tuberculin test. As a general policy in the eradication of the disease they recommend the separation of healthy and diseased animals, after application of the tuberculin test, with a view to the construction of a healthy herd. With the object of preventing the spread of infection, persons buying cattle for breeding purposes or milk production should, except when such purchases are made from disease-free herds which have been tested by a properly-qualified person, purchase only subject to the tuberculin test. In order to assist in the proper carrying out of this suggestion the Commission recommends that official authorities should adopt such regulations as will prevent the entry into their respective territories of cattle for breeding purposes or milk production unless accompanied by satisfactory charted records of the tuberculin test. The distribution or use of tuberculin by unauthorized persons should be prohibited. There is much need for a better education of the farmer as to the nature of bovine tuberculosis and the way to eliminate it; to further this end it is recommended that a pamphlet on bovine tuberculosis

should be written, couched in simple language which would be understood by every person of average intelligence. It is also pointed out that the press might do much to enlighten the general public, and that if people were made to realize how much the welfare of the community depends on the health of its food-producing animals, public opinion would provide a valuable stimulus towards the eradication of the disease in cattle.

ALCOHOLISM AND DEGENERATION.

PROFESSOR KARL PEARSON has recently published a supplement[1] to the memoir on alcoholism and its effects on the next generation, which has given rise to so much debate in our correspondence columns and elsewhere. In this supplement Professor Pearson considers the objections raised by Professor Marshall and Mr. J. M. Keynes, to the effect that the original memoir compared alcoholic families with degenerate or unhealthy non-alcoholic stock. In our judgement, Professor Pearson is successful in demonstrating that the onus of proof lies on those who assert that the groups compared are really differentiated in respect of characters other than the alcoholic habit. With regard to another point raised by Mr. Keynes,[2] to the effect that no evidence is adduced as to the habits of the parents at the time of the birth of the children, Professor Pearson writes: "The reply to this is that there are as many children of 5 and 6 as of 11 and 12, and if some children were born before parental alcoholism had started, some were certainly born after, and therefore this mixed category should be worse than the category containing children whose parents have not been alcoholic at all Further, a pretty wide experience of the relative healthiness of children, earlier and later born, has shown us that the preponderance of criminality, idiocy, phthisis, and other signs of degeneracy usually attributed to parental alcoholism occurs among the *elder* born." Both criticism and rejoinder abound in those amenities which, in accordance with some mysterious psychological law, appear to be inseparably associated with writings on alcoholism. Thus, Mr. Keynes remarks: "As a contribution to the solution of the general problem the memoir is almost valueless, and, from its failure to direct the reader's attention to essential facts, actually misleading." Professor Pearson, not to be outdone in candour, writes: "And it is not the members of the Eugenics Laboratory, but the Cambridge economists in their cloistered studies, who exhibit ignorance, when they try to demonstrate that the Edinburgh sample belongs to an exceptionally 'low grade' population in which 'physical and moral squalor are rampant.'" Let us warn the reader that this is not a newspaper controversy about "Tariff Reform" and "Free Trade," but a serious discussion between eminent men of science. As we stated in noticing the original memoir, we are not prepared to express a final opinion respecting the important social problems with which it deals. It is, however, our duty to say that, so far as the present controversy is concerned, it appears to us the assailants of Professor Pearson have been somewhat over-hasty, and have been too eager to occupy ground which may prove untenable. We must add the expression of our earnest hope that some small measure of courtesy may be introduced into a discussion which bids fair to be prolonged and vehement.

[1] *Questions of the Day and of the Fray.* No. 1 Supplement to the memoir entitled, "The Influence of Parental Alcoholism on the Physique and Ability of the Offspring. A Reply to the Cambridge Economists." By Karl Pearson, F.R.S. Pp. 26. London: Dulau and Co. 1910. (1s.)

[2] *Journ. Roy. Statistical Soc.*, lxxiii, 739.

MALTA FEVER IN FRANCE.

AUBERT, CANTALOUPE, AND THIBAULT (*Ann. de l'Inst. Pasteur*, May, 1910) state that an important nidus of Malta fever exists in the department of Gard, in the Cevennes, a region where goats are very abundant. They have investigated an epidemic of this disease which broke out in 1909 at Saint-Martial, a hamlet situated in this district. Clinically, bacteriologically, and epidemiologically the epidemic was without doubt attributable to infection with the *Micrococcus melitensis;* and it was preceded by an epizootic amongst goats which was also directly associated with infection by this micrococcus. The inhabitants of the infected area consumed a large quantity of goat's milk, and the authors have no doubt that this was the medium in which the infection was conveyed. They have not been able to discover how the epizootic originated, but they ascertained that it spread from a particular farm where a large number of goats had been brought together. Investigation of the domestic animals in the affected area by means of the serum agglutination test yielded the following results: Out of 213 goats 67 (31·9 per cent.) were found infected, and out of 74 sheep and 96 rabbits infection was found respectively in 7 (1.9 per cent.), and in 20 (20·8 per cent.). With regard to the sheep, they state that ewe's milk is hardly ever consumed now as human food, but when not used for feeding the young lambs, is turned into cheese. Whether the *Micrococcus melitensis* may be present and retain its vitality in such cheese, is a point which they have not yet determined. The authors think that the frequency of infection amongst the rabbits investigated is a matter of some significance; if these animals excrete the micrococcus in their urine, they may prove to be a dangerous means of spreading the disease. They appear to have no doubt as to the reliability of the serum test (dilution 1 in 20) on rabbits, since they investigated a large number of control rabbits at Marseilles and found that none of them gave a positive result, even with a dilution of 1 in 10.

CENTENARY OF THE BERLIN MEDICAL FACULTY.

THE celebrations recently held in Berlin on the occasion of the centenary of the university were attended by many eminent persons belonging to different countries. Professor Sudhoff, the well-known medical historian, publishes in the *Berliner klinische Wochenschrift* of October 11th, a somewhat ornate account of the Medical Faculty in Berlin from its inception to the present day. He traces the career of the men who made the Medical Faculty of the Berlin University famous, from Wilhelm Hufeland to Johannes Müller, Rudolf Virchow, and Robert Koch. He speaks in enthusiastic terms of the pathological, clinical and bacteriological advances achieved in Berlin, of the high level of the Faculty as a teaching body, and of its immense importance a a seat of learning. We congratulate the university, and especially the Medical Faculty, on the brilliant success with which their work has been conducted and the high reputation their leaders have won throughout the learned world.

OLD GLASGOW HOSPITALS.

THE deplorable condition of the public hospitals up to comparatively recent years is a matter of common knowledge, and the dirt and discomfort of the old Town's Hospital of Glasgow, so graphically described by Dr. Hugh A. M'Lean in an interesting article which appeared in the September number of the *Glasgow Medical Journal*, were by no means peculiar to Scotland, but may be taken as a fair example of a state of things universal throughout Europe during

the early days of the nineteenth century. In fact, despite the lack of sanitation and almost total disregard of cleanliness, the Glagow Hospital at that time compares favourably with the majority of similar contemporary institutions, inasmuch as its patients do not appear to have been actually ill-treated or neglected, as was so frequently the case in other hospitals at the same period. A proof of this is furnished by the fact that, besides their food, patients were supplied with tobacco and snuff at the expense of the hospital. The Town's Hospital, or Town's House, was founded in 1733, and built with funds supplied by the Kirk Session, the Council, and other public bodies. Dr. M'Lean, quoting from the Glasgow historian, M'Ure, who wrote three years after its foundation, says that the new hospital "is of modern fashion, and exceeds any of that kind in Europe, and admired by strangers." The same authority also informs us that the patients were attended daily by three members of "the Faculty of Physicians, Surgeons, and Apothecaries . . . and to their deserved praise they furnish the sick with daily attendance, drugs, and medicine gratis, and when any of them dies they are decently buried at the Town's charges, and their place furthwick filled up." Nearly a century later the hospital contained over four hundred patients, though it was only built to hold about three hundred and twenty beds. The majority of the patients were old and bedridden, but some sixty or seventy were "fatuous or insane." The lot of these latter unfortunates was pitiable. They were confined in small cells (from 7 to 11 ft. square and 6 ft. high), on the ground floor, with stone floors and ceilings, and no fireplaces; and these little dens contained two or three beds, sometimes with a couple of patients in each. The only means of warming the cells was by "a flue for communicating heat," which ran through the gallery into which they all opened; and the only method of ventilation was through small gratings in the cells and in the gallery. To add to the misery of the wretched occupants the stone floors of the cells were very damp, and, in the words of an eyewitness, "this is much increased, from the necessity of having them frequently washed in consequence of the filthy and unclean habits of many of the inmates." The other patients were better off than the unhappy lunatics, for, though they were often put two in a bed, the wards were large, and both sufficiently ventilated and properly heated. Their enjoyment of these comforts, however, was a somewhat precarious one, since the whole hospital was usually flooded—sometimes to the depth of several feet—once or twice a year, owing to its "being situated so very near the river and surrounded . . . by several common sewers." Another drawback must have been the dunghill, which was thoughtfully placed "at the west end of the front building," and supposed to be cleared away every fortnight by a neighbouring farmer. The eyewitness quoted above, Dr. Auchenloss, writing in May, 1832, about the outbreak of cholera which had ravaged the hospital a few months previously, states that before the epidemic this accumulation of filth had not been removed for some time, and as "the straw from the cells of the lunatics, saturated with filth and moisture, is regularly mixed with the dung, and, the surface being exposed and open, the effluvia and noxious vapours have been considered by some sufficient to account for the breaking out of the pestilence."

THE CIGARETTE BEETLE

In his latest report, the Medical Officer of the City of London records a case in which some rooms, used as a dwelling-house and situated over a warehouse, had to be vacated in temporary favour of a swarm of flying beetles, with whose enjoyment of their captured quarters sulphur dioxide did not appear materially to interfere. The invading force was traced to some bags of turmeric stored in the basement close to some open windows; the bags were honeycombed with maggots. Eventually the beetles were identified as belonging to the species *Lasioderma serricorne*. It is one which, in common with its first cousin *Lasioderma testaceum*, has a particular interest for smokers, since though, as the incident shows, these beetles are not very particular as to their surroundings, their favourite home is tobacco in the form of cigars and cigarettes. Mr. Theobald, of the British Museum, drew attention to their existence some seven years ago, pointing out that they had been found most frequently in Burma cigars and in Manila cheroots, but were almost cosmopolitan and ready to attack most dry vegetables. The egg stage lasts from eight to sixteen days, while the grub stage, which normally occupies six weeks, may last for a year or more. The pupal stage is short, only about eight days. The development of the larvae is hastened or retarded by heat and cold, and the developed beetles normally live about two months. Damage is done alike by larvae and beetles, and since a single tunnel into a cigar or cigarette is sufficient to stop its drawing, quite a small number of beetles and their larvae may suffice to destroy a whole box or boxes of cigars or cigarettes. Mr. Theobald on the occasion mentioned stated that when a box or case of cigars was found infested with the larvae of this beetle, further development of the mischief could be checked by bisulphide fumigation. We are thankful to say that hitherto we have had no occasion to put this observation to the test; when we do we shall not be surprised to find that a better way still is to throw the box away and secure a new one. We have no doubt that the fumigation would be effective, but a mixed flavour of tobacco and carbon bisulphide does not sound attractive.

THE PREVENTION OF MALARIA IN INDIA.

At the Malarial Conference, opened at Simla by His Excellency the Viceroy and Governor-General of India on October 12th, 1909, it was decided amongst other things that the Government of India should appoint a Central Scientific Committee, and an indication, under different headings, of the work that should be done by this body was also laid down. This central committee, consisting of Lieutenant-Colonel J. T. W. Leslie, C.I.E., I.M.S., President, Lieutenant-Colonel D. Semple, Captain S. R. Christophers, I.M.S., and Major S. P. James, I.M.S., Secretary, held a meeting on May 12th, 1910, to consider how some of the subjects enumerated in the Government of India's letter could best be dealt with. The following questions were submitted for the committee's consideration: A. Work of the central committee: (1) The formation of a type collection of *Anopheles*; (2) the collection of biological facts about *Anopheles*; (3) the formation of a type collection of malaria and other blood parasites; (4) the collection of malarial literature, maps, gazetteers, etc.; (5) the issue of a bulletin; (6) field work. B. Work of the provincial officers. It was agreed that questions 1 to 4 could best be dealt with by the establishment in the first instance of a Central Malaria Bureau, and it was decided to create such an establishment at Kasauli, where the necessary books and other materials could be collected. As regards question 5, a decision was arrived that a journal or bulletin should be issued every three or four months, and that its title should be, "Paludism: Being the Transactions of the Committee for the Study of Malaria in India." As regards field work, the most urgent

lines of investigation in the opinion of the committee were: (1) A continuation of the inquiry concerning epidemic malaria; (2) an inquiry into the conditions associated with endemic malaria, the most suitable area in which to begin this inquiry being the Jeypore agency in the Madras Presidency; (3) an inquiry on the bionomics of *Anopheles*; (4) an inquiry on quinine. Captain Christophers, it was thought, could carry out (1); for (2) and (3) additional workers would be necessary, while as regards (4) medical superintendents of gaols might help. In connexion with subject B—the work that will be done by provincial malariologists—it was decided to ask the Government of India to address the several local Governments and Administrations, and for this purpose a series of questions upon which information was desired by the Central Committee was drawn up, one of the most pertinent of these being, "Which of the different species are concerned in the spread of malaria in Nature in India?" In addition to this, Captain Christophers now holds a class of instruction at Amritsar in the Punjab, where medical officers and subordinates are suitably trained. The whole scheme seems a very sensible one, and its progress will be watched with keen interest in England and other places which are specially concerned in the prevention of malaria.

PROGRESS IN ELECTRO-THERAPEUTICS.

Dr. H. Lewis Jones, the President for 1910–11 of the Electro-Therapeutic Section of the Royal Society of Medicine, only availed himself of the presidential privilege of giving an address at the first meeting of the session to the extent of making a few remarks upon the progress of electro-therapeutics in general. In the course of those remarks, however, he expressed appreciation of what he described as the cordial and sympathetic leading article upon the same subject which appeared in the British Medical Journal of August 27th, accompanying the report of the proceedings of the Section of Medical Electricity and Radiology which formed part of the annual meeting. The article, he said, gave encouragement to the workers in this branch of medicine—encouragement which he thought they deserved for their industry and for their efforts to approximate electro-therapeutics to the standard of an exact medical science. Proceeding, Dr. Lewis Jones said that the emphasis of the moment was certainly upon the use of large currents. This subject was brought greatly into prominence by Bergonié and others at the Congress of Physiotherapy in Paris, a few months ago. They might in future have to think in ampères instead of in milliampères. Indeed, in what was coming to be known as diathermy—the sending of heat internally into the tissues by means of a special kind of high-frequency apparatus—patients had been treated by currents of one, two, or even more ampères. He looked forward to the early abandonment of their little electrodes of a few square inches in extent and the adoption of large ones measuring something like a square foot. At St. Bartholomew's lately they had been using large currents, getting up to 75, 80, or even 100 milliampères for ionic medication. Another feature of the electro-therapeutic work at St. Bartholomew's was the use of rhythmic currents. He believed that to refrain from using rhythmic currents would soon mean that the individual worker or the electrical department of the hospital was behind the times.

DIATHERMY.

London has lately had a visit from one of the leading Continental exponents of the new method of diathermy, Dr. Franz Nagelschmidt of Berlin, who gave a demonstration at St. Bartholomew's Hospital, and afterwards before the members of the Electro-Therapeutic Section of the Royal Society of Medicine at their meeting on October 21st. Diathermy, or thermo-penetration, describes the heating of diseased tissue by electrical currents of high frequency. This is done by means of an apparatus which has already been described in these columns, the high frequency system employed having a smaller voltage and a higher milliampèrage than the type of high frequency with which we have hitherto been familiar. It is well known that the various local applications of heat only elevate the temperature of the tissues to a slight depth, but the currents of von Lepell's high frequency system in their passage elevate the temperature of the deep tissues to any required extent. Dr. Nagelschmidt in his address divided the application of diathermy into surgical and medical categories. The surgical application is based upon the fact that very great heat secures the coagulation of tumours and neoplasms, and thus leads to their destruction. In the medical application the treatment is so regulated that the smaller intensity of the current and the different size of the electrodes produce less rise in temperature than that which is necessary for surgical purposes, but the results are manifested in the relief of pain and other symptoms, in neuritis, for example, upon which Dr. Nagelschmidt reported one or two cures. We have not space to indicate the many clinical applications to which he alluded. Suffice it to say that his technique in coagulating a large tumour is to proceed gradually from layer to layer, removing each thin, charred layer with the curette after the burning action has been applied. One of the great advantages of the method is the absence of haemorrhage, and he laid stress upon the fact that during diathermic operations the blood vessels and lymph channels are securely sealed at the moment of separation by the coagulating property of the heat.

"SOCIETY OF INFANT CONSULTATIONS."

A meeting was held on October 19th at the St. Marylebone General Infirmary to inaugurate the formation of the "Society of Infant Consultations." Among the vice-presidents are Sir Lauder Brunton, F.R.S., Dr. Hope (Liverpool), Dr. Niven (Manchester), Dr. Florence Willey, Dr. Sykes (St. Pancras), Dr. McCleary (Hampstead), and Lord Avebury. Dr. Eric Pritchard (chairman of the executive committee) pointed out the great value of infant consultations, and showed that not only did it appear to be the most satisfactory means of combating infantile mortality, but it was also the cheapest. Dr. Sykes stated that he hoped to form a society in St. Pancras which would deal chiefly with the social aspect of the prevention of infantile mortality, but that, when formed, he did not think it would overlap the work of the Society of Infant Consultations. Resolutions were then put by the Chairman, and after some discussion and amendment were passed unanimously in the following form: "(1) That a 'Society of Infant Consultations' be formed, and be called by this name. (2) That the aim and object of such society be: (*a*) To bring into closer relationship and assist all those engaged and interested in the work of such institutions; (*b*) to promote the establishment of similar institutions, and advise as to their organization; (*c*) from time to time to hold meetings for the reading of papers and discussion on subjects germane to the work of infant consultations; (*d*) for the recording of experience gained by individuals engaged in the work; (*e*) for the collection of literature, statistics, and reports bearing on the subject. (3) That the society consist of a president, vice-presidents, treasurer, librarian, and ordinary members. (4) That the expenses of the

society be defrayed by a subscription of 2s. 6d. from each member." A hearty vote of thanks to the chairman was then given. All communications or requests for information may be addressed to either of the honorary secretaries, Dr. Ronald Carter, 11, Leonard Place, Kensington, W., and Dr. Janet Lane-Claypon, 69, Prince of Wales's Mansions, Battersea Park, S.W.

ADVANCES IN TROPICAL MEDICINE.

PROFESSOR J. L. TODD, of McGill University, Montreal, recently read a paper[1] before the Johns Hopkins Medical Society, the subject chosen being "A Review of the Recent Advances in our Knowledge of Tropical Diseases." The work done during the past year is chiefly reviewed, the author stating that "although no very extraordinary addition has been made to our knowledge, a great mass of work has been done during the past year on subjects connected with tropical medicine, and much has been done to consolidate and co ordinate what is known concerning them." He also mentions the part the different Governments have taken in forwarding such researches. Work on sleeping sickness, spirochaetes, kala-azar, and Oriental sore are the chief items of last year's programme. The same author, in the *Montreal Medical Journal* (vol. xxxix, August, 1910), contributes a note on human trypanosomiasis, the histories of five cases of trypanosomiasis in Europeans being given. Three of the cases reported were treated by thorough dosing with liquor arsenicalis, and the patients were well two, two, and three years respectively after the commencement of their disease. The author is sanguine as to the ultimate result, but several years will have to elapse before the cases can definitely be said to be cured. The prognosis of sleeping sickness at the present time cannot be said to be a hopeful one.

HEALTH OF PANAMA.

COLONEL W. C. GORGAS brings out a monthly report of the Department of Sanitation of the Isthmian Canal Commission, and the one for August, 1910, reveals a very satisfactory state of affairs. The total number of deaths from all causes among employees was 55, 31 from disease and 24 from external causes, giving an annual average per thousand for all causes of 13.04; for diseases 7.35, and external causes 5.69 Among the employees during the month there died from malarial fever 4; from lobar pneumonia, 7; from tuberculosis of the lungs, 2; other forms of tuberculosis, 2; tetanus, 1; and from other diseases, 15. No cases of yellow fever, small-pox, or plague have been brought to or originated on the isthmus during the month. A death-rate of only 13.04 per thousand might well be envied by many towns situated in temperate regions. It is certainly a striking testimony to the thoroughness with which Colonel Gorgas and his staff carry out their great work.

THE WANDSWORTH SCHOOL CLINIC.

AS already announced, the Wandsworth School Clinic will be opened in Garratt Lane, Wandsworth, on January 1st, 1911. It has received the approval of the London County Council and the Board of Education, and will be under the control of the Wandsworth Division of the British Medical Association. At this clinic will be treated those children found on medical inspection to be defective in ears, nose, throat, or eyes, whose parents cannot afford the fees of the local doctors. It will be used only by the children attending the London County Council schools within the London County Council Wandsworth electoral area (excluding Streatham). A nurse, appointed by the London County Council, will be in daily attendance. There will be a staff of seven local registered medical practitioners, who will hold office for only one year, and will be succeeded by others in rotation; they will attend during the afternoons. Cases of ringworm will be treated at the surgeries of local medical practitioners. The London County Council will elect the staff. A meeting will be held at the Town Hall, Wandsworth, on Friday, December 2nd, at 8 p.m., to discuss points affecting the treatment of the children in order that by the co-operation of all interested the clinic may prove successful.

[1] From the *Johns Hopkins Hospital Bulletin*, vol. xxi, No. 232, July, 1910.

ACCIDENTS TO SCHOOL CHILDREN.

WE have received an official letter from Mr. G. L. Gomme, Clerk of the London County Council, in which he informs us that the Council has recently had under consideration the question of the fees to be paid for the first medical attendance on children who meet with accidents in public elementary schools, and has adopted the following scale, which will come into operation as from December 1st, 1910: (*a*) In the case of a child who meets with an accident in the school, and who is taken to a doctor's surgery, 3s. 6d.; (*b*) in the case where a doctor is summoned to the school to attend a child, 5s. Claims in excess of these amounts will, if there are exceptional circumstances, receive special consideration. These fees will be paid by the Council for the first attendance only.

AMONG the Fellows recommended for election to the council of the Royal Society are Dr. W. H. Gaskell and Dr. C. J. Martin. Dr. J. Rose Bradford is recommended as one of the two secretaries.

THE annual meeting of Fellows and Members of the Royal College of Surgeons of England will be held in the College, Lincoln's Inn Fields, W.C., on Thursday, November 17th, at 3 p.m.

PROFESSOR J. G. MCKENDRICK, F.R.S., formerly Professor of Physiology in the University of Glasgow, has been elected Provost of Stonehaven. This, it is stated, is the first occasion on which Professor McKendrick has taken part in municipal politics. His return at the top of the poll at the recent town council election is a proof of his great personal popularity in Stonehaven, with which he has been connected for forty years.

WE are asked to state that in the report of the Organizing Committee of the Seventeenth International Congress of Medicine which appeared in the JOURNAL of November 5th, p. 1448, the name of Colonel Sir David Bruce was accidentally omitted from the list of those elected to the Committee.

RUMOURS as to the prevalence of an "epidemic" of cholera in Rome have prevented many persons from visiting the Holy City. We are able to state on the highest authority that as a matter of fact the few cases which made their way into the city were promptly isolated, together with all "contacts." In no single case has there been any extension of the disease.

England and Wales.

[*FROM OUR SPECIAL CORRESPONDENTS.*]

LONDON.

London County Council.

Coroners' Law Amendment.

The General Purposes Committee, in a report to the London County Council on November 8th, set forth the points of divergence between the recommendations of the Departmental Committee on Coroners and the views of the Council as expressed in a series of resolutions passed on October 30th, 1906. The Committee regarded the introduction of Sir William Collins's Coroners' Law and Death Certification (Amendment) Bill as affording an opportunity of giving effect to the principal recommendations of the Departmental Committee, and recommended the Council to urge the Government to give facilities in the autumn session for passing the bill. The Council agreed to this course, first reaffirming, at the suggestion of the General Purposes Committee, those opinions which the Departmental Committee did not endorse. These were: (1) Coroners should be paid by salary, and should be required to devote their whole time to the duties of the office; (2) the number of jurymen should be not less than six nor more than eleven, and the jurymen should be summoned strictly by rota; (3) the office of deputy should be abolished as unnecessary in London; (4) the view of the body by the jury should be dispensed with, except in cases in which the coroner and a majority of the jury thought it necessary; and (5) no fees for giving evidence or making *post-mortem* examinations should be paid to medical officers employed in rate-aided institutions.

Compulsory Notification of Ophthalmia Neonatorum.

The Council decided to order, under Section 56 of the Public Health (London) Act, 1891, that compulsory notification of infectious disease should apply in the administrative county to ophthalmia neonatorum. The Midwives Act Committee asked that the Council should take action with a view to the more effectual prevention of blindness or impairment of vision caused by the want of prompt and efficient medical treatment among newly-born infants. The compulsory notification of ophthalmia neonatorum might prove advantageous. So far as the practice of certified midwives was concerned, there was already in existence a method of notification, as one of the rules of the Central Midwives Board, made under the provisions of Section 3 of the Midwives Act, 1902, and confirmed by the Privy Council, required every certified midwife to advise that medical assistance should be obtained in every case of inflammation of the eyes, however slight. This advice must be given in writing in a prescribed form and a copy must be sent to the local authority within twenty-four hours. The information obtained under a compulsory notification order would enable the medical officers of health of the various sanitary districts (the metropolitan boroughs) to make known to those concerned the opportunities available for treatment in necessitous cases. It would be found of value in cases in which the infant was taken to a medical practitioner, perhaps at a hospital, who did not have the opportunity of keeping it under treatment, and incidentally it would serve a useful purpose in bringing to light cases attended by midwives concerning which they had omitted to advise that medical aid was necessary. Notification would render more complete the arrangements for securing continuous and efficient treatment of the child.

The Order will be advertised, and a copy sent to every qualified practitioner residing or practising in the County of London.

A Southwark Slum Clearance Scheme.

The Housing of the Working Classes Committee reported that the medical officers of health for Southwark and Bermondsey had made representations that the houses in Tabard Street and Grotto Place areas, Southwark, and the Crosby Row area, Bermondsey, were unfit for human habitation; that the narrowness, closeness, and bad arrangement of the streets and houses; the want of light, air, and ventilation, were dangerous to health, and that an improvement scheme was urgently required. The Committee, in recommending the Council to spend £387,700 in buying the three areas, forming an open space, and rehousing half the population in block dwellings, gave some particulars of these wretched slums; most of the houses are low-ceilinged, the ground floors lower than the street level, and the streets themselves extremely narrow. The death-rate from all causes during 1904–08 in the Tabard Street area was 36·8, in Southwark 18.2, and in London 14·9; the phthisis death-rate was 3.88, 2·09, and 1.44 respectively; and the death-rate from the principal endemic diseases was 6·07 in the Tabard Street area, 2·29 in Southwark, and 1.71 in London.

The Council sanctioned the improvement scheme.

Board of Education and Medical Inspection.

On the report of the Education Committee submitting a draft reply to the letter of the Board of Education with regard to medical inspection, Mr. George Lansbury had given notice of an amendment to substitute the words:

> That the Board be informed the Council regrets its failure to carry out to the satisfaction of the Board the duties laid upon it with regard to medical inspection, and has instructed its Education Committee to report as to the action to be taken in order that the Council may discharge in a generous manner its obligations in respect of medical inspection.

The amendment, however, was not moved, and the draft letter was approved.

MANCHESTER AND DISTRICT.

The Glasgow University Club in Manchester.

On November 1st Sir James Barr presided at the fifth annual dinner of the Glasgow University Club in Manchester. In proposing the toast of "Alma Mater," he said that Glasgow had been trying to extend its medical school, and he did not agree with that. He thought there were too many medical schools already in the country, and if some of them were shut up it would be all the better both for the profession and the public. What was wanted was more post-graduate work. Young men thought that when they had spent five years in a medical course they ought to begin at once to earn some money, but really they were then only just beginning to learn their profession, and he thought that a post-graduate school would be an enormous advantage to Scottish education. In responding to the toast, Professor Cameron said that out of 3,408 students at the Glasgow University, 709 were in the medical department. He then went on to speak of the attitude that the Government ought to take with regard to the enormous number of quacks who now sold their remedies without limit. He thought it was high time that the Government should protect the public against the evils of quackery, especially referring to the alleged cancer cures. Any ignoramus, who might be a butcher, or a shipwright, or a carpenter, or others, who set themselves up as better able to cure cancer than the surgeon, ought to come under the lash of the law.

NEWCASTLE-UPON-TYNE.

Professor Osler and the Northumberland and Durham Medical Society.

One of the most interesting and most important events of last week here was the visit of Professor Osler and his address to the Northumberland and Durham Medical Society. At the afternoon meeting, in the Connaught Hall, the President of the Society, Dr. A. C. Burnell, in the chair, Professor Osler, who was supported on the platform by Sir George Hare

Philipson, Sir Thomas Oliver, Dr. James Drummond, Dr. Modlin, and others, addressed a large meeting of members and friends. Professor Osler spoke of the hospital unit in university work. While it was the function of a university to teach and to advance learning, he felt that, in order to extend its work in the medical schools, all branches of the curriculum should be included and encouragement given so that all learning might become profitable. The university claimed that hospital work came within her province and that she should have some voice in the control of hospital affairs, especially those which concerned the teaching of the student by men who ought to be paid for their services. While the hospital primarily stood for the cure of the sick and the relief of suffering, it was also an institution for the study of the problems of disease and for the training of men to serve the public. These last two functions came within the sphere of university influence. Hospital trustees had not always the money with which to acknowledge the services rendered by physicians and surgeons, and, besides, laboratories were required wherein students might become better qualified for the treatment of disease.

In the evening the society held its annual banquet, at which Professor Osler was the guest of the evening. Upwards of 140 sat down to an excellent dinner by Messrs. Tilley in the King's Hall of the Armstrong College. After the loyal toast had been disposed of Dr. Burnell proposed the health of Professor Osler. In a felicitous speech Professor Osler acknowledged the compliment, and subsequently paid a high tribute to the general medical practitioner. He begged him to regard a large infirmary as his best friend, one whose acquaintance he should never lose. The harmony of the evening was much advanced by songs rendered by Mr. Ernest Potts and Mr. T. Dunn of the College of Medicine and by music supplied by Amer's orchestra.

Royal Victoria Infirmary Chapel.

The infirmary chapel, consecrated by the Bishop and used as a place of worship for many months after the opening of the infirmary, was closed two years ago by order of the governors because Nonconformists were not allowed to worship in it. The chapel still remains closed. It has now been arranged that religious services shall be conducted in the library by Anglican and Nonconformist clergymen alternately.

BIRMINGHAM.

Hospital Saturday Fund.

The total amount of the present year's collection up to the present date is £20,167 17s. 11d., as compared with last year's total of £19,689 7s. 4d., showing an increase of £478 10s. 7d. There are still further items to come in before the fund finally closes, so that the total will probably be between £500 and £600 more than in the previous year. This increase is very necessary, as well as satisfactory, on account of the continually increasing work of the fund. Apart from the normal growth of work the fund will be required to support very soon a sanatorium of its own for consumptive patients on Romsley Hill, about eight miles from Birmingham. The plans are now being considered for the sanatorium, which is designed to contain beds for fifty patients. £10,000 of the fund are annually divided among the hospitals and nursing societies of the city.

St. Thomas's Men in the Midlands.

The third annual dinner of old St. Thomas's Hospital men living in the Midlands was held at the Midland Hotel, Birmingham, on Thursday, October 27th. The invitations were sent to all the old St. Thomas's Hospital men residing within a radius of fifty miles of Birmingham. Mr. W. F. Haslam was in the chair, and the guest of the evening was Mr. G. H. Makins, Senior Surgeon to St. Thomas's Hospital. Dr. A. E. Russell, Physician to Out-patients at St. Thomas's Hospital, and Dr. Seymour Taylor, Senior Physician to the West London Hospital, were also present as guests. After the loyal toasts, the toast of "St. Thomas's Hospital" was proposed by Mr. W. F. Haslam, and responded to by Mr. G. H. Makins. Dr. A. E. Russell and Dr. Seymour Taylor were also called upon to respond. Dr. A. V. Bernays proposed a vote of thanks to Dr. Sawyer for acting as secretary for the dinner. Mr. H. H. Heffernan proposed a vote of thanks to the Chairman, and Mr. Haslam responded. The meeting was thoroughly appreciated by all the old St. Thomas's Hospital men present.

Work and Financial Position of Hospitals.

The total number of patients treated in the various institutions in Birmingham during the year 1909 exceed a quarter of a million, and although many of these patients wander from one institution to another, and probably some of them are counted twice or more times in the same hospital, yet the number of patients receiving free medical aid can scarcely be less than 200,000 yearly. The totals given are the number of patients treated, not the number of attendances.

The ordinary income of the Birmingham hospitals and medical institutions for the relief of patients was during 1909, £93,853, and the ordinary expenditure was £113,019, exceeding the income by £19,166. There is an excess of expenditure over income in all these medical institutions of Birmingham.

STAFFORDSHIRE.

Prevention of Blindness.

A conference for the purpose of considering preventable blindness was held in Wolverhampton on Friday, November 4th, and was attended by most of the medical officers of health in the county and by delegates from all municipal and urban sanitary authorities and other public bodies in Staffordshire. The delegates having been welcomed by Dr. John Grout, the Earl of Lichfield took the chair and delivered a short address. In the course of it he said that one duty of local authorities was to see how they could save money for the ratepayers. One way of doing so would be to prevent blindness. Each blind child costs the education authorities about £500, while an ordinary child only cost about £30. The proportion of the former to the latter would be greatly reduced if compulsory notification of infantile ophthalmia were introduced. The plan had been put into operation in the northern part of the county with great success. If cases were dealt with at their early stage, the cost of treatment need not exceed £1 1s. a case, and the total cost of notification and treatment would only equal an expenditure of 17s. 5d. per 1,000 of population. Mr. E. V. Greatbatch, Chairman of the North Staffordshire Blind and Deaf Institution, was then introduced to the audience by the chairman as the originator of the movement. He said that in the northern part of the county, where the disease had been made compulsorily notifiable, after nine months' experience only 2 per cent. on 75 cases occurring in the six districts included in the order were not saved. Dr. H. H Folker also spoke in favour of the adoption of a scheme for the prevention of blindness from untreated and inadequately treated ophthalmia neonatorum, and finally Dr. H. Malet, medical officer of health for Wolverhampton, proposed the following resolution:

> This meeting is of the opinion that the disease known as ophthalmia neonatorum should be added to the list of notifiable diseases under the Infectious Disease (Notification) Act, 1889, and that provision should be made by the public health authorities for ensuring that every case receives proper medical help and nursing, under Section 133 of the Public Health Act, 1875. Also, that it is desirable that the Notification of Births Act, 1907, should be adopted.

The resolution, having been seconded, was duly carried. Readers will remember that a discussion on the administrative control of ophthalmia neonatorum, with Staffordshire as an object lesson, was introduced by Dr. George Reid in the Section of State Medicine at the Annual Meeting this year. Among other things,

Dr. Reid mentioned[1] that the scheme so successfully adopted in North Staffordshire had originated in a conversation between Mr. Greatbatch and Dr. Folker.

WALES.

Welsh National Memorial.

A "special appeal to Wales," on behalf of the Welsh National Memorial to King Edward VII, has just been issued by the promoters from the Newtown offices of the movement. The appeal, which is signed by the Lord Mayor of Cardiff (Chairman of the General Committee), Mr. David Davies, M.P. (Honorary Treasurer and Chairman of the Executive Committee), and Professor Thomas Jones, M.A. (the Secretary), describes how the decision to commemorate King Edward VII by a national effort to stamp out consumption has united all classes and creeds in support of the project. The movement, it is declared, promises to remove the stigma under which the country now rests. Having recited the terms of the gracious message to Wales in support of the movement, sent by King George in response to a telegram sent him, some startling facts are given as to the ravages of consumption in the Principality. Of the fifteen counties in the United Kingdom having the highest death rate from phthisis, no fewer than seven are Welsh. In Carnarvon the death-rate from phthisis is 40 per cent. higher than in England and Wales as a whole, while Cardiganshire has a death-rate from phthisis which is nearly double the average of England and Wales. The objects of the crusade will be to convince the public that it is preventable, and to wage a persistent warfare against the prevailing ignorance and fatalism. The campaign will be divided into three main divisions: (1) An educational propaganda; (2) the provision of model dispensaries; (3) the erection of sanatoriums. It is also proposed to organize: (1) Travelling tuberculosis exhibitions; (2) popular lectures with lantern slides; (3) an information bureau for the press and public; and (4) the distribution of literature. Qualified medical men and women are to be appointed to deliver lectures on the subject in English and Welsh throughout Wales and Monmouthshire. They will explain in simple language what medical science has discovered about the causes and cure of tuberculosis. The "appeal" contains the names of donors of £100 and upwards, and shows that of the £300,000 required, the actual amount promised or subscribed up to date approximates £160,000, leaving £140,000 more to be raised. When the Campaign Fund is closed, the whole list of the subscribers will be published. All are invited to help. Definite steps are now being taken by the Executive Committee in the important work of organizing the collection of funds throughout the whole of Wales and Monmouthshire. Public meetings, convened by the Lords Lieutenant, will be held in all the counties to bring home to the public the necessity for an active campaign, and to secure the appointment of a strong and representative county committee with an honorary secretary. The primary duty of each committee will be to secure a systematic and thorough canvass of each county by the appointment of local collectors in every town, village, or district. The General Committee consists of the Lords Lieutenant, the High Sheriffs, the members of Parliament, and the county and county borough medical officers of health of Wales and Monmouthshire. The first county meeting in South Wales in support of the Memorial was held at the Victoria Hall, Llandrindod Wells, on November 4th; Sir Powlett Milbank, Bart., Lord Lieutenant, presided. Mr. David Davies, M.P., sketched the proposed methods of operation, and urged that they should not now squabble about details, but unite in the determination that there should be a great campaign against this terrible disease. A county committee has been formed, with Dr. J. Murray, Llandrindod, as secretary. The announcement of the gift of £5,000 by Miss Thomas, Llwynmadoc, was received with cheers.

[1] British Medical Journal, September 3rd, page 604.

Scotland.

[FROM OUR SPECIAL CORRESPONDENTS.]

Scottish Poor Law System.

The Stirling and Clackmannan Association of Inspectors of Poor recently celebrated its fiftieth anniversary at Stirling. Mr. John Paterson, Inspector of Poor, Stirling, and President of the Association, was in the chair. At a luncheon held after the conference Lord Balfour of Burleigh, K.T., proposed the toast of the "Stirling and Clackmannan Society of Inspectors of Poor." He said that in a short time he would have completed his forty-first year of continuous service as chairman of a parochial board. In addition to that he had served ten years as chairman of the combination poorhouse, had been for eight years responsible for the Presidency of the Local Government Board, and during these forty years he had had a personal acquaintance with every one of their outdoor inspectors. He might claim, therefore, to know something of the inspectors of poor. In his opinion the efficient inspector was the very corner stone of efficient administration of the Poor Law. It was a difficult and complex system; it did not always give satisfaction. Taking Scotland all over, there was no body of men who commanded respect more thoroughly and deserved it more than the inspectors of poor, taking them as a whole. Their administration was not perfect. But he would say that the success of their administration of the Poor Law was largely due to the efficiency of the inspector of poor. There had been commissions of inquiry on the reform of the Poor Law, and it was one of the things which Government after Government had promised and were still promising. But it was not a very easy task. Lord Balfour of Burleigh next referred to the unit and area of administration. In England they had large areas; in Scotland, in the main, very small areas. He preferred the smaller area, because the real groundwork and essential thing for a successful administration of the Poor Law was knowledge. He was largely in favour, wherever it was possible, of whole-time inspectors, It was not always possible, but under such auspices as they were met that day it was possible for the less experienced inspectors to meet and confer with their more experienced brothers. He cordially supported the scheme lately promulgated for the granting of diplomas to inspectors of poor who deserved them, whether for their knowledge or general capacity for managing the business entrusted to them. This had his warmest support, and he hoped it would be put to greater efficiency. He wanted to see more co-operation between the public and private effort. He put forth an appeal for the children. These children were sent out at a very early age to struggle for themselves. The adult might be responsible, he might be in fault, but no reproach could rest upon the child. The child was never responsible for its misfortunes. At the age of 14 these children were expected to shift for themselves, and in this connexion he brought into prominence the Scottish Girls' Society, which did most useful work in caring for these children when they were launched upon the world.

Registration of Fever Nurses.

At a special meeting of the Association of County Councils in Scotland, held on November 1st, a letter was read from Dr. Wilson, Medical Officer of Health for Lanarkshire, as Secretary of the Medical Officers of Health Association, pointing out the serious manner in which the staffing of fever hospitals would be affected by the Nurses' Registration Bill, which was to be considered on the reassembling of Parliament. The association was asked to oppose the bill until a clause was inserted providing for the registration of fever nurses, and that training in a fever hospital should count as part of the training of a nurse for admission to the general register. It was suggested that the matter should be remitted, with powers, to the Executive Committee, and this was agreed to.

EDINBURGH.

Royal Society of Edinburgh.

The first ordinary meeting of the Royal Society of Edinburgh was held on Monday, November 7th, when the following ballot took place:

As British Honorary Fellows: James George Fraser, Professor of Social Anthropology in the University of Liverpool; Sir Joseph Larmor, Lucasian Professor of Mathematics in the University of Cambridge, Secretary of the Royal Society; and Alfred Russel Wallace, O.M. As Foreign Honorary Fellows: Hugo de Vries, Professor of Anatomy and Physiology of Plants in the University of Amsterdam; F. A. Forel, naturalist and limnographer, Morges, Switzerland; Karl F. von Goebel, Professor of Botany in the University of Munich; Jacobus Cornelius Kapteyn, Professor of Astronomy in the University of Groningen; Elie Metchnikoff, Vice-Director of the Pasteur Institute, Paris; Albert Abraham Michelson, Professor and Head of the Department of Physics in the University of Chicago; Wilhelm Ostwald, Emeritus Professor of Physical Chemistry in the University of Leipzig; Frederick Ward Putnam, Professor of American Archaeology and Ethnology in Harvard University; and August F. L. Weismann, Professor of Zoology in the University of Freiburg (Baden).

The Treatment of Consumption.

Some time ago, as reported in the JOURNAL, a proposal was made and carried in the Town Council of Edinburgh that in consideration of a grant of money, the Corporation should have a right to a certain number of beds in the Royal Victoria Hospital for the Treatment of Consumption, and, in addition, that the medical officers of health should have access to all the data accumulated there. One of the principal inducements leading the Corporation to give the grant was that in so doing they might be able to learn much which would enable them to cope with the disease in its beginning stages, and in spreading sound ideas on infection. There was a good deal of preliminary work before the agreement between Dr. Philip as representing the Victoria Hospital and the Town Council could be completed; but this has now been done, and ten beds are now at the disposal of Dr. Williamson, the medical officer of health. The cases intended to be dealt with are those in which the disease has just begun. The hope of the public health authorities is that as the result of the treatment in the hospital and the instructions as to future procedure, much may be done to mitigate the effects of the scourge.

GLASGOW.

University News.

The period of matriculation ceased on October 31st. The number of students matriculated in the Medical Faculty at Gilmorehill is 555, and at Queen Margaret College for Women 64, a total for the university of 619.

Royal Infirmary.

Several important alterations in the constitution of the board of managers will be proposed for the consideration of the qualified contributors at the coming annual general meeting. It is suggested that the number of working men representatives be increased from two to four; that the professors of medicine and anatomy be no longer *ex officio* managers, and that instead of them and the manager at present nominated "by the Faculty of the College of Glasgow," in future two managers shall be nominated by the Senate and two by the Court of the University. Among other changes, it is proposed to remove the right of the members of Parliament of the city to be *ex officio* managers and that of the Established Church ministers of Glasgow annually to appoint one manager. On the other hand, it is proposed to allow the Muirhead trustees to nominate one manager, the Faculty of Procurators to nominate two managers, and the Town Council to nominate three managers instead of one manager as at present. Among other changes foreshadowed is that of transferring to the managers the right at present possessed by the general contributors to make by-laws and regulations at the general meetings.

Clinical Laboratory for the Victoria Infirmary.

It is only a short time since the Edinburgh Royal Infirmary opened the new clinical laboratory so generously provided by an anonymous donor. It is now the turn of the Victoria Infirmary to acknowledge the generous gift of £5,000 for a similar purpose by a donor who, curiously enough, also desires to remain anonymous. With a suitable clinical laboratory the Victoria Infirmary will be in a much better position than it has hitherto been to undertake clinical research. As the Western Infirmary has nearly completed the building for its clinical laboratory, the Glasgow medical institutions will soon be well supplied with facilities for clinical research.

The Cinematograph in Medicine.

Within the course of the past twenty years the teaching of medicine has been revolutionized. Dry systematic lectures have been brightened and rendered more interesting by the use of the projection lantern and the epidiascope, which can show an image of the actual specimen. Those members of the Glasgow Medico-Chirurgical Society who were fortunate enough to hear Dr. Levaditi, of the Pasteur Institute, Paris, lecture on phagocytosis were introduced to the very latest phase of projection demonstration. Every one had heard of the cinematographic record of abdominal operations, but that the cinematograph could also be used to demonstrate the movements of spirochaetes and trypanosomes and reveal the actual process of phagocytosis by white blood cells came as a revelation to most of the members present. By a series of wonderfully clear records Dr. Levaditi was able to show these and other processes absolutely true to life, which brought home to those present the extraordinary influence of immunized serum upon the infecting micro-organisms, and how thereupon the white cells were able to ingest and digest the affected organisms.

Lunacy Report.

The annual report by Dr. John Carswell, Certifying Physician in Lunacy to the Glasgow Parish Council, has been issued for the year ending 15th May, and is very encouraging. The cases reported during the year numbered 1,018, of whom 533 were certified insane. This is 25 less than the previous year, and the lowest recorded for five years. Of these 533 cases only 392 were certified for the first time, the others having been previously under certificate. On an estimated population of 660,713 this figure represents a production rate of 56.3 per 100,000, the lowest for the last ten years. As regards age incidence 47 males and 38 females became insane between the ages of 15 to 30; 66 males and 48 females between 30 and 45; and 44 males and 38 females between 45 and 60. Thirty-seven males and 52 females became insane after reaching 60 years of age. The report states that the figures for the last ten years reveal a gratifying decrease in the occurrence of insanity during the young and active periods of life, and while they also reveal a marked increase during the older period of life the increase is limited in extent. There are, moreover, grounds for believing that this merely indicates a certain readiness to use asylums for the care of patients whose mental infirmity was not formerly treated in such institutions. In this connexion it may be stated that 25 patients of advanced years came from Barnhill Poorhouse. Districts of the city with high death-rates have high lunacy-rates, while those with low death-rates have low lunacy-rates, which goes to show that the causes of bodily and mental diseases are similar in their origin and operation. This view may be considered prosaic when contrasted with the popular idea that insanity is the price we pay for civilization, but it is rational and hopeful and based on facts.

Medical Inspection of School Children.

An interesting point in connexion with the medical inspection of school children came up recently in Largs. The assistant medical officer had excluded

four children from one of the schools on the suspicion that they were affected with scarlet fever, and ordered that they were not to be readmitted till furnished with a medical certificate. The parents of three of the children refused to be at this expense of getting the medical certificate, with the result that the children were still excluded from school. The members of the school board unanimously agreed that the parents should not bear the expense of the certificates, seeing that there was no actual disease, but only the suspicion of it, and the children were excluded in the interests of the other scholars; and it was decided to communicate with the chief county medical school inspector to determine how to obtain the necessary certificate.

Sanitary Condition of Pittenweem, Fifeshire.

Dr. Dewar, of the Local Government Board, has reported unfavourably on the sanitary condition of Pittenweem, and specially in regard to pig keeping in the town, the local authority having neglected to enforce its by-laws. The Local Government Board has allowed the burgh authorities two months to effect the required improvements, after which it desires to be furnished with a report on what has been done. The Local Government Board points to the responsibility that would rest on the burgh authorities should there be any outbreak of disease attributable to prevailing insanitary conditions.

Dunfermline College of Hygiene.

Dr. Alister Mackenzie, M.A., D.P.H., F.R.S.E., who was on the staff of the Edinburgh City Fever Hospital, has been appointed lecturer on anatomy and physiology.

Colliery Medical Appointments in Fife.

After over a year's negotiations it is reported that the question of the appointment of a medical officer to the West of Fife collieries is now nearly settled. A scheme has been drawn up by the Collieries Doctors' Association and the representatives of the miners, and recommended to the men. The scheme has been adopted in most of the villages where meetings were held. At some of the meetings exception was made to a clause relating to friendly societies, and it is probable this clause will be taken out, it being stated that the friendly societies are quite capable of taking care of themselves. The principle embodied in the scheme for which the men have been holding out, is freedom of choice of medical attendant. At present, it is stated, many of the workman, while deduction is made at the office for the colliery doctor, prefer to pay in addition for their own doctor. The decision of the men will now be placed before the Miners' Board, and then placed before the coalowners of Fife. It is expected that there will be no opposition offered to the completed scheme.

Ireland.

[FROM OUR SPECIAL CORRESPONDENTS.]

Presentation to the Master of the Rotunda.

On November 2nd Dr. Hastings Tweedy was made the recipient of a handsome presentation by many past and present nurses of the Rotunda Hospital, on the occasion of his retirement from the post of Master of the hospital on the conclusion of his seven years' term of office. The presentation consisted of a handsome silver tray of Celtic design and of an album containing the names of the subscribers. In addition Mrs. Tweedy was presented with a handsome watch. Dr. Little, Consulting Physician to the hospital, made the presentation on behalf of the nurses, and referred in his remarks to the large increase in the number of available beds in the hospital during Dr. Tweedy's tenure of office, and also to the increase in the accommodation for nurses and students. In expressing his thanks, Dr. Tweedy spoke of the unfair position in which Irish midwives had been placed by the Midwives Act, and expressed the hope that before long legislation would be introduced which would remedy the present injustice.

Later in the week a meeting of the board of governors of the hospital was held, and a vote of thanks was passed to Dr. Tweedy for his devoted attention to the patients and to the interests of the charity during his term of office. Dr. Henry Jellett, King's Professor of Midwifery and Gynaecologist to Sir Patrick Dun's Hospital, was then elected Master of the Rotunda in succession to Dr. Tweedy.

National University of Ireland.

At the first meeting of the Senate of the National University of Ireland for the purpose of conferring degrees a rowdy scene, which reminded one of similar meetings of the defunct Royal University, prevailed. Crowds of students collected at the end of the hall, and kept up an incessant clamour, accompanied by the discharge of various missiles, so that the interesting and eloquent address of the Vice-Chancellor of the University, Sir Christopher Nixon, M.D., was quite inaudible. An impression was thus produced in the minds of some members of the public—who were not aware that occasions of the sort are often utilized by students for the relief of pent-up exhilaration—that strained relations existed between the students and their teachers. To obviate this impression a representative meeting of the senior students of University College was subsequently convened in Cecilia Street Medical School, and a letter has been issued to the press stating that many of the offenders were not members of the university at all, and deprecating any suggestion that any but cordial relations existed between the university officials and the students of the university.

Superannuation Bill.

At a recent meeting of the Council of the Irish Medical Association the Superannuation Bill which it is proposed to submit to Parliament in the coming session was discussed and unanimously approved. Some of the members of council expressed the opinion that pressing forward this bill at the present moment was unwise in view of the promised scheme of Poor Law reform, which would necessarily include clauses dealing with superannuation, but after discussion all opposition was withdrawn, and it was decided to send a copy of the bill to each of the Irish Members of Parliament. The terms of the bill are as follows:

1. This Act may be cited for all purposes as the Local Government (Ireland) Amendment (Ireland) Act, 1910.

2. (1) Every officer who is at the date of the passing of this Act an officer of any district council or any board of guardians of any union in Ireland shall be qualified for a superannuation allowance, and shall, without prejudice to any existing right when he resigns or ceases to hold his office for some cause other than misconduct, be entitled to receive a superannuation allowance on the scale and according to the acts and rules relating to His Majesty's Civil Service.

(2) For the purpose of this Act the expression "qualified for superannuation allowance" shall mean qualified as regards age and length of service, and the devotion of his whole time to the service, except as respects a medical officer to whom the Medical Officers' Superannuation Act (Ireland), 1869, applies.

3. All superannuation allowances which shall be paid under the provisions of this Act shall be paid from the same funds and in the same proportions as the salaries and emoluments of the officer being superannuated are now payable by law.

4. The term "officer" shall include:

(1) A duly qualified medical practitioner in the service of a board of guardians holding an office under the provisions of the Act for the more effectual relief of destitute poor in Ireland, or the Medical Charities Act, 1851, and the Acts amending the same respectively.

(2) A medical officer of health of a sanitary district under the Public Health (Ireland) Act, 1878, or any Act or Acts amending the said Act.

(3) A registrar of births, deaths, and marriages holding such office contingent on his position as dispensary medical officer.

National Medical Service for Ireland.

The replies to the circular issued by the Conjoint Committee of the British Medical and Irish Medical Associations to the members of the profession in Ireland with reference to the establishment of a national medical service have on the whole been coming in well. Out of a total of about 2,400 medical men, nearly 1,750 have replied, and of these replies not more than 35 have been unfavourable to the projected scheme. The amount of active opposition

may therefore be judged to be small. As, however, the committee will be in a much better position to urge their scheme if more unanimous support for it can be shown to exist than the present figures warrant, it is hoped that the six hundred odd medical men who have not yet expressed their opinion will do so without delay. In some of the counties more than 95 per cent. of the issued post-cards have been returned signed, but elsewhere, more especially in Leinster and Munster, the returns have not been so good.

Health of Belfast.

At the meeting of the City Council held on November 1st the Medical Officer of Health reported that the mortality was 14.8, or 13.1 as a comparative rate. Only 9 cases of typhoid, but 68 of scarlatina and 26 of diphtheria, had been notified. The City Fever Hospital at Purdysburn was congested in its scarlatina wards; it is, happily, of a mild type. Plans for doubling the accommodation at this hospital at a cost of about £18,390 were ordered to be prepared; this will bring the number of beds up to 268. On the same day a deputation of the Public Health Committee waited on the Poor Law guardians to ask their aid in case the scarlatina epidemic should increase.

Asylum Capitation Grant.

Reference has previously been made in these columns to the diminution in the Government grant to the county asylums in Ireland, owing to the exhaustion of the fund from which the grant was payable. A deputation was recently received by Mr. Birrell for the purpose of discussing the situation, and as a result of this certain questions which Mr. Birrell asked the deputation to consider have been referred to the various county councils who had sent representatives on the deputation. These questions were as follows: (1) If it was considered best that the Treasury should contribute a sum in respect of each lunatic confined in Irish asylums. (2) Whether it was considered that the cost of the upkeep of lunatics should be an imperial or local charge. (3) Assuming the charge to be an Irish charge, whether it should be levied on the whole of Ireland or be paid by districts according to need and ability. The Co. Dublin County Council recently met to discuss the above questions, and unanimously passed the following resolution:

> That in the opinion of this Council the grant from the Loca Taxation Account should be as it was originally—one-half of the original cost per head for each pauper lunatic in the asylums; and, further, that the area of taxation should be the same as at present.

It was further thought advisable by many of the members that the Government grants should be placed on the Consolidated Fund, and not on a fund which was liable to fluctuate.

Jamaica.

[*FROM OUR SPECIAL CORRESPONDENT.*]

Annual Health Report.

The annual report of the Superintending Medical Officer for Jamaica for the year ending March 31st, 1909, was issued some time ago. With it are included reports on the public hospital, the lying-in hospital, lunatic asylum, and lepers' home. Jamaica has a well-organized public medical service, hospitals and district medical officers being scattered all over the colony. Excluding the Kingston Public Hospital, there are no less than nineteen provincial hospitals. The amount expended on the medical service during 1909 was over £39,000; to this must be added a further sum of £3,143 for drugs supplied to the various institutions.

Vaccination.

Twenty-one thousand six hundred and sixty-two vaccinations were performed during the year; the cost was £1,451. It is stated that no arm-to-arm vaccination takes place now in the public service. Lymph is obtained from the Lister Institute, and is received fortnightly by the Royal Mail Steamship Company. Although the younger generation are efficiently protected against small-pox, the same cannot be said for the adult population.

Yaws.

The number of cases of yaws treated, 5,332, is much in excess of previous years. It is stated that the treatment of yaws will always be unsatisfactory until some system of segregation or compulsory treatment can be introduced and kept in force, the former being by far the best. The people look upon the disease as one that every child must go through, and so pay little attention to it. Possibly the increased number coming under review is due to the fact that it is now a notifiable disease

Malaria.

Malaria still claims a large number of victims; the total number of admissions in the public general hospitals during 1909 was 7,939. The disease would not be so prevalent if more attention was paid by householders and others in getting rid of the various breeding places of the *Anopheles* variety of mosquitos in their backyards and on their premises. Parochial boards could also help in this matter by insisting that all those living within their towns and villages shall keep their premises in a sanitary condition, and by themselves keeping the towns and villages sanitary.

Public Hospitals.

Over 18,000 cases were admitted to the public general hospitals in 1909, with 380 deaths. Malarial fever, as already mentioned, forms by far the largest number of admissions, rheumatism also bulks largely in the admission list. Diseases of the respiratory systems supply a large number of admissions.

Sanitation.

Dr. Ker mentions that during his last vacation he went through the Jamaica and English public health laws, and drew up a rough code, so as to make the Jamaica laws run on the same lines as the English ones. Owing to unforeseen circumstances it could not be got ready for the last session of council. At present all the sanitary laws are distributed throughout various years instead of being consolidated.

Bacteriologist.

Seeing that the medical service is now placed on a satisfactory basis, it seems a little behind the times that no bacteriologist is attached to the department. Attention to this want is mentioned in the report, and the senior medical officer urges the Government to make suitable provision for one in the next estimates.

Kingston.

The medical officer for Kingston reports that the death-rate, 34.22 per 1,000, was considerably lower than in the previous year. Enteric fever was very prevalent during the year, 245 cases being reported. The causes of this outbreak seem to have been filthy latrines, and the clouds of dust which float about during dry and windy weather.

The number of patients treated in the public hospital during the year amounted to 3,729; there were 362 deaths.

The most prevalent diseases treated in the public hospital were malarial fever, tuberculous diseases, enteric fever, and venereal diseases; 69 cases of phthisis were treated, 22 of which proved fatal. A considerable amount of operative surgery goes on in the hospital.

Lying-in Hospital.

The number of patients admitted during the year was 596, with 10 deaths. We note that forceps was only used in 16 cases.

Lunatic Asylum.

The number of inmates at the beginning of the year was 1,032; the admissions during the year amounted to 237. There were 120 deaths.

Lepers' Home.

There were 24 admissions during the year, with 15 deaths, and remaining in the home at the end of the year under review 113.

In his report Dr. Neish, the medical attendant, states that for two years he has been treating leprosy with nastin. The results are practically negative. The disease is no more retarded or arrested than would be demonstrated by any form of tonic treatment, and, in Dr. Neish's opinion, is not as effective as the treatment by mercurial injections or chaulmoogra oil.

The report on the medical department of Jamaica shows that much good and useful work has been done by the district medical officers; reference was made in a previous article (see p. 112, July 2nd, 1910) to the amended rules in connexion with the district medical service, and it is to be hoped that the Government will help this deserving body of medical men to collect the fees to which they are entitled under the amended tariff.

One criticism which might be made in connexion with this report is that the covering letter forwarding the district medical officers' separate reports to the Colonial Secretary by the Superintending Medical Officer might contain a more extended summary of the work done in the various districts and hospitals.

Special Correspondence.

PARIS.

Physiology and Therapeutics—Some Statistics on Tuberculosis.

THE fireworks of the autumn congresses came to an end with two brilliant set pieces—the congress of surgery and the Congress of Medicine. Neither presented any point of novelty. There was, of course, the inevitable discussion over "606," but no definite conclusions were arrived at. In this the disputants showed their wisdom, since, amongst doctors, hasty conclusions are invariably promptly abandoned or revised. At the Medical Congress the most brilliant of our surgeons expounded his medical and serum-therapeutic treatment of tuberculosis, which remains the most easily cured and yet the most deadly of all diseases. Perhaps one may be allowed to express regret that microbiology should have done so much harm to physiology. The more one studies modern therapeutics the more one is reminded of a man whose watch is out of order, and whose only idea of setting it right is to shake it and tap it with his finger (revulsion), then to pour oil into it (pharmacotherapy). The science that raised Claude Bernard to so high a pinnacle of fame should be restored to its proper place—at the head of all others—for it has been rather neglected in the search after microbes. The majority of scientific researchers seem to regard the organism of the human body as a crucible in which take place chemical reactions of a somewhat complicated nature, or as an arena where phagocytes and micro-organisms strive against each other for mastery, disease being caused by these disturbances, in the production of which, perhaps, they take an equal part. Was Claude Bernard wrong when he wrote the following passage, now completely forgotten: "There will never be a science of medicine so long as the explanation of the phenomena of pathological life is divorced from the explanation of the phenomena of normal life. These two states are regulated by the same forces, and differ from one another only by the particular conditions under which the vital law is manifested"? The physiology of nutrition is particularly difficult, since, being obliged to study it *in vivo*, one runs a serious risk of disturbing the very phenomena one desires to observe, but happily science provides us almost daily with fresh means of investigation, and the human body will soon become as transparent as a glass in a laboratory. It is physiology, and physiology alone, that can give us the key to certain problems which have till now defied solution, in spite of the various and contradictory opinions of theorists and scientists whose observations have been confined to externals. Amongst such problems may be placed the relations between the different constitutional affections, the affiliation of certain diseases, the knowledge of temperament, and the inheritance of tuberculosis, which has been so much questioned. With regard to the latter, a very full and interesting statistical report was published quite recently by Dr. Pégurier. This report gives the result of his clinical observations of 700 families under his care, taken from the working classes of Nice, and comprising 1,400 direct ancestors and 3,280 children. The following extract, published in the *Revue internationelle de la tuberculose*, contains the most important points: "Tuberculosis appeared in equal proportions in the father and mother of consumptives; 36.7 per cent. had tuberculous parents; 37 per cent. non-tuberculous but alcoholic parents; but, assuming that the former class includes tuberculous alcoholics, the child of a tuberculous parent seems to run less risk of becoming phthisical than the child of an alcoholic. Hereditary alcoholic antecedents accelerate the evolution of the lesions. The mortality amongst the children of alcoholics, one-half of which do not reach the age of 2 years, is considerably greater than the mortality amongst the children of consumptives, the characteristic stigmata of the two inheritances being comparable in every particular. The tuberculous and still more the alcoholic taint seems to increase the fertility of the parents to a considerable extent. This is a curious but well-known fact, and seems to suggest that there is a resistance of the instinct of preservation, which multiplies the individuals in proportion to their debility, and saves the race by means of numbers. It is also noticeable that Nature is not so successful in her struggle against artificial and deliberate poisoning as in resisting passive infection. If in addition to this the rate of mortality before birth is taken into account, we are led to a conclusion which, thus summarized, might have pleased Schopenhauer: 'Nature tends to compensate for pathological misfortune, and consecrates race suicide.' It is true that, to be exact, one ought to write 'the suicide of vice,' which would open up unexpected moral horizons in medicine and pathology, and perhaps justify the philosophers who believe that the precepts of all human ethics resolve themselves into the necessity of conservation and collective progress of humanity, and are simply the unconscious laws of a superior instinct. But having reached this point, it is time to stop and apologize for touching upon metaphysics, which seem as though they were to become once more fashionable amongst French doctors, who, having pursued the infinitely little for so long, feel the need of relaxation in lofty speculations." It may be recalled that Professor Landouzy, Dean of the Faculty of Paris, opened the Congress of Medicine with a very fine discourse on modern vitalism.

AN appeal for fresh support is made to the public on behalf of the Garden Cities and Town Planning Association. It is said to be the only society which advocates and organizes the control of a separate town or city, with a fixed relation to surrounding agricultural land. Letchworth is now a rapidly increasing town, where industries of many kinds are being carried on, with their attendant population. The Hampstead Garden Suburb and the present development of a smaller garden suburb estate known as Valentines, at Ilford, bear witness in outer London to the force of an idea which is also manifested at Harborne, Woodlands, Bristol, and elsewhere in the United Kingdom. It is pointed out that, owing to the increased work and responsibility thrown upon it, the association feels the necessity of largely increasing both its membership and its resources. "The welfare of our race in the future depends upon a satisfactory solution of the difficulty of securing healthy and happy conditions of life for the industrial worker and his family, and it is sincerely hoped that those who feel the importance of the subject in its physical and moral aspects will now lend their aid by becoming members of the association and subscribing to its funds."

Correspondence.

DIASTOLIC BLOOD PRESSURE—A CORRECTION.

SIR,—A correspondent has kindly drawn my attention to what might seem contradictory statements in my address in the BRITISH MEDICAL JOURNAL of November 5th. At page 1390, second column, line 38, I say, "Its relation to systolic tension . . . is nearly 1 to 4." The "its" here refers to the difference between systolic and diastolic pressure, or pulse pressure, mentioned at the end of the preceding paragraph. But it might be supposed to refer to "diastolic pressure" mentioned at the beginning of the preceding paragraph, and in this case is apparently in contradiction to the statement in line 45 that the relationship of the diastolic to the systolic pressure is as 3 to 4. If the readers of my address will correct it by substituting "The relation of pulse pressure to systolic tension" instead of "Its relation to systolic tension" that ambiguity will disappear.—With many apologies, I am, etc.,

London, W., Nov. 7th. LAUDER BRUNTON.

NATIONAL MEDICAL SERVICE.

SIR,—Dr. Buist's contribution to the JOURNAL of November 5th will meet with the ready approval of those of the profession who desire the abolition of contract practice, in so far as he admits that the problem of our troubles is a social economic one. This is the point I have tried to drive home in my letters since last April—that the origin of clubs was in the bad economic conditions prevailing at the time and in the consequent necessity of the profession's making the best of these conditions.

If no one else would do it, for our own sakes we had to take care of the underpaid worker on the terms he could afford: hence the capitation grant and club practice, accepted as a lesser evil than bad debts and haggling over fees with those patients. But now the conditions are entirely changed. Someone else *will* do it, namely, the State. We did not ask the State to do it; social progress is responsible for that. Government says it recognizes that the wage-earner cannot provide for the contingencies of sickness as they arise, and proposes by means of the usual and inevitable "contribution per head or per pound of wages," that is, the ordinary methods of insurance, to insure the wage-earner against these contingencies. I submit that we medical men are now out of the running, and should be glad of the opportunity of freeing ourselves from a burden which was, and is, quite foreign to the business of medical practice. We now resume our place as medical practitioners pure and simple, ready as sellers to give our service to the buyer, who is now not the poverty-stricken wage-earner, but the solvent State Insurance Company. The *raison d'être* of clubs and contract is gone. Dr. Buist tries to reimpose the doctor's former disability by suggesting that as the wage-earner *could not* meet his liability in full, so the State *will not* do so, and adduces as an argument that the State must "budget" for a definite sum, and that therefore it will throw the risk of "the yearly variation of sickness" on the profession. Dr. Buist says that "no evidence but pious aspiration has been advanced" to show that the State could bear this risk itself. It strikes me that we have nothing to do with this, and that the Government might be left to deal with a difficulty which is essentially of its own making; but, if we must meddle with business not our own, I would suggest that the difficulty be met by "budgetting" for a fixed sum and applying it to cover the sickness liability of a smaller number of beneficiaries than can, even in a bad year, outrun this amount. The Government scheme is progressive; Mr. Lloyd George has told us that he intends to begin with a small number and enlarge the scheme in successive years; let him therefore begin with a number which cannot by any possibility exhaust the amount he is ready to expend, and carry over at the end of each year the balance unexpended, having always sufficient in hand to meet any epidemic, or, if he likes, rely on a supplementary grant, *as is done with other national expenses*. Consider for a moment what the alternative means—that the profession should be willing to meet the risk of an epidemic out of its own pocket, health, and strength. I object altogether to the assumption that we should relieve the State of the risk of the "variation of sickness." Dr. Buist's reference to the probable "appreciation by the majority of the empiric character of the formula 'payment for services rendered'" may be read in diametrically opposite ways, as approbation or sarcasm: Dr. Buist may wish us to understand that these men in "good practices" fled from private practice with "payment for services rendered" to a fixed salary with fixed duties; or he may mean, as I hope he does, that they found private practice, largely weighted with bad debts and clubs, with "payment per head" and unlimited attendance, inferior to a fixed amount of work at a small salary. He surely does not mean the former, for I know personally some of the men who have exchanged "good practices" for "the dullest of medical duties" with a fixed small salary; these "good practices" have in many cases been found unsaleable, and, if Dr. Buist would care, I could give him some information about one such derelict North of the Tweed, and why its incumbent was glad to accept a fixed salary of £250 a year for *fixed* work.

This, however, is surely evident enough, that Government intervention—the logical outcome of social progress—between the wage-earner and the vicissitudes of life, renders unnecessary any longer the anomaly of *our* intervention, which made us responsible for the charity which public opinion holds as obligatory.

We as medical men deal now with a solvent State instead of with an insolvent patient, and our terms to the former should be free from all taint of the charity which was essential to the latter. These sentiments also Dr. Buist may characterize as "platitudes" (I thank him that he called them "jointed" and not "disjointed"), but it is no bad policy to reiterate forgotten platitudes: a policy built up without them is likely to be a tottering one.

I presume the statement "that the evils of contract practice arise not from the contract, but from the lay control of the funds" is not a quotation as I cannot find it in the Contract Practice Report. If a deduction, as it appears to be, would it not be more exact to say "*some* of the evils of contract practice arise from lay control," or "*some* of the evils of contract practice might be remedied by professional control"? Surely we are agreed that there are inherent evils in contract practice which are insuperable by any control. On the other point I am entirely in agreement with Dr. Buist; we must all be prepared to stand by the majority of the profession, even if its proposals should not be the same as ours; what we in Bristol are asking is that the profession should have the matter put plainly before them, with the pros and cons of *every* method of dealing with this *new* matter that has arisen, and not be asked to say "yea" or "nay" to a one-sided question.

I very much regret to see in the JOURNAL of November 5th a letter from the Gateshead Division which goes far to destroy the effect of the admirable and temperate one it sent on May 7th. I am certain that of the sixty-one members of the Bristol Division who voted last month (against a minority of one) in favour of "payment per service," not one will hesitate to bury his own opinion if the Association concludes with open eyes in favour of "payment per head."—I am, etc.,

Bristol, Nov. 5th. HARRY GREY.

SIR,—I have to thank Dr. Harry Grey for the courtesy of his reply to my letter, and for giving me the opportunity to continue without delay a discussion which is of such importance and so urgent. The point of difference between us is not the need for adequacy in the future remuneration of the medical profession, but simply as to the mechanism by which this is to be secured. The Association will, I hope, succeed in securing that an adequate sum be provided, but it seems to me that even with a Chancellor of the Exchequer we are bound to regard the conditions under which he manages his income, just as we consider the circumstances of our private patients in giving them credit or accepting round-sum payments. We must surely consider whether we are likely to get better terms if we say that we will only have cash down, or if we say that we are willing to average things over a series of years. If we are to have a cash-down system, we are not the only parties to the fixing of the scale in the first instance, and, further, the Association has already found the tendency of a minimum scale to become the maximum, and it is much

more difficult in practice to raise an inadequate scale of fees than it is to raise a too low capitation payment.

There is, I hope, no intention on the part of any one in the Association to admit an element of charity in the terms of the new service, but it is evident that members fail to realize that we are not now discussing a continuance of the old contract system. The new system, which alone we are considering, is one with adequate funds and medical control, and free from the conditions of which, if Dr. Grey objects to my gloss, the Association found "that the cause of the above evils is the advantage which non-medical organizations are able to take of the competition between individual medical practitioners."

There is one further point of advance towards agreement in this discussion in that Dr. Grey admits the possibility of a central fund in the hands of the State, and suggests a means by which it can be accumulated at the Treasury.

I would again emphasize—and on this Dr. Grey and I stand side by side—the necessity for unity when we have fought out our differences. Had the profession united in the past, we could ere now have had clear lines as to the limits of charity and business; without union, we shall now fail to secure adequate terms on either system, and Divisions who are in the frame of mind indicated by the letter from Gateshead would do well to think two or three times before they decide to adopt Little Jack Horner as their prototype.—I am, etc.,

Dundee, Nov. 7th. R. C. Buist.

Sir,—The letter of Dr. Buist, when stripped of its non-essentials (which include sneers at men who are doing sound work for the general practitioners—I nearly put for the British Medical Association, but they are not synonymous—yet) is practically summed up in his question in the second paragraph—namely:

> Am I prepared to stand by the majority of the profession even if its proposals should not be the same as mine?

This is a question pregnant with a very deep and far-reaching meaning, and I put it to Dr. Buist: Is he prepared to stand by the majority of the profession even if its proposals should not be the same as his? If so, will he advocate steps being taken to obtain the view of the majority of that part of the profession—namely, general practitioners—who alone are affected (adversely) by this invalidity insurance scheme? And having obtained that view, will he help the general practitioner all he can in its attainment?

Dr. Buist explains this question, and says it means in other words: Is the British Medical Association to be empowered to deal with the problem in the name of the profession or are we to work each for his own hand?

If this means that the general practitioners of this country are to submit themselves blindly to the leadership of the present Representatives of the British Medical Association, who are—many, if not most of them—misrepresentatives of the members of the Association, I say No! most emphatically No!

In this suggested invalidity insurance it is general practitioners alone who are affected; a study of how they are represented will be instructive.

In my own Division we have three Representatives, who were elected *en bloc*, and at a Branch meeting of seven persons we were told the "Division" had nominated them, and it was passed with little remonstrance, but nobody objecting, as one of them was present. Of these three Representatives two certainly are not in favour of advocating a scheme of "payment for work done." My own particular Division is almost solid in its preference for that scheme, and under the circumstances it is obvious that we shall be "given away" if we leave our interests to our Representatives.

I will go further and ask, How can general practitioners be properly represented when from the very nature of their vocation they are prevented from going on to representative bodies? (I of course mean bona-fide practitioners who are dependent upon their practices for their livelihood.)

As it is, bona fide general practitioners are not on the representation (so-called), and their interests are left to men who are consultants, whole-time officials, retired men, service men, men with private means, professors, etc., in fact, to a class of men who know little of the requirements of general practitioners, and who are not in touch or sympathy with them.

As a remedy I would suggest that the British Medical Association formulate a scheme of "payment for work done," and let every general practitioner have a copy to compare with the "club scheme" already issued, then let it be discussed in the Journal and at the Division and Branch meetings for five or six weeks, during which time no editorial or official pronouncement be made, and *then* let the general practitioners vote for what they mean to have, and I think they will get it.

I must apologize for trespassing on your space so much, and will conclude by expressing my hearty appreciation of the straightforward and definite pronouncement of the Gateshead Division.—I am, etc.,

Northwich, Nov. 6th. Henry Edward Gough.

Sir,—The letter appearing in your issue of November 5th, signed by the Chairman and the Secretary of the Gateshead Division on behalf of their Executive Committee, must have been read with feelings of pain by any members who look upon the Association as the best agency we have for redressing the grave evils of contract practice throughout the country. The threat of secession if the Association dares to disregard their views is hardly what one would have expected of any body of medical men. It reminds me of an incident that occurred on our local horticultural committee. One of the members, a gardener, having failed to carry a small point with regard to one out of the 120 classes, retorted by saying, "Then I shall not show at all, and I shall have nothing to do with the society in future." Such childish petulance may be forgiven in a gardener after a heated argument, but we surely look for something better as the result of the deliberations of a body of able and educated medical men forming one of our Divisions.

On the other hand, we have men who say they will have nothing to do with any scheme that suggests a freedom of choice of doctor. These men wish to stick to their clubs, bad as they are.

Others, again, demand that they shall be allowed to hold on to their part-time Poor Law appointments, although the conditions of service and remuneration are admittedly degrading.

With such divergency of views amongst members, how can we expect any betterment, unless we agree to some form of compromise which will bring about the greatest good to the greatest number of the profession?

Dr. Buist is clearly right when he suggests that at the present time the most important question for each of us individually is:

> Am I prepared to stand by the majority of the profession even if its proposals should not be the same as mine?

Gateshead apparently would answer this question in the negative. If others follow their lead, what chance have we of any betterment in the conditions of the poorer class practice—a class of practice on which the majority of the members of the profession depend for their livelihood? The old saying about "the house divided against itself" is as true as ever. The old fable of "The Bundle of Sticks" is still pertinent. If we cannot agree to act together *loyally* and to sink our own minor preferences when they have been overruled by the majority, after consideration in the constitutional manner agreed upon by ourselves, then the Association may as well close its doors. Its powers as an agency for the betterment of the conditions of practice are at an end. I know no other body that can help us. The scandalous conditions of contract practice not only will not improve but will certainly become even worse.

For the present state of affairs we have only got ourselves to thank. The wage-earning classes have combined, and by acting loyally to each other have obtained all possible advantages for themselves—at our expense. We on the other hand have been apathetic, we have shown little combination, we have not stood loyally by one another, either in public or private, in the face of the common danger. We have not looked after our own rights, and certainly we could not expect others to look after them for us. The result is that we have had to submit to the dictation of friendly societies, and have had to accept a degrading scale of remuneration. State departments are apt to look upon terms of payment which have

been accepted by medical men under the stress of disunion, competition, or poverty as a satisfactory rate of professional remuneration. Now, rightly or wrongly, we are led to believe that the State is about to take steps to enormously increase the scope of provident or contract practice. It behoves us to bestir ourselves, lest, under worse conditions in the future, many of our professional brethren may be absolutely ruined by this intervention of the State.

We seem to be agreed that the present state of so-called contract practice is a disgrace, and that its present condition is due to the factors I have already enumerated—namely, that by our own apathy we have allowed the dictation of terms to pass entirely into the hands of lay bodies. The Representative Meeting has therefore instructed the Council to prepare some scheme which would meet any requirements likely to be made by the State, and which would at the same time be satisfactory to the medical profession. Such a scheme is, I believe, shortly to be sent down to the Divisions for discussion. With this scheme there will, I believe, be alternative methods of arranging for payment of the medical men; and it is on this point that there is likely to be the greatest divergence of opinion. Now in general practice there are three methods in which our work is remunerated:

1. *Payment for Time.*—This is seen in most whole-time medical appointments. It is also met with in such part-time appointments as require a definite attendance for so many hours a week or a month for a fixed salary. It also enters slightly into such recognized scales of medical charges as that published in *Whitaker's Almanack*.

2. *Payment for Piecework.*—This means a definite fee for each visit, and is the general rule in most private practice other than appointments. It is also the method adopted in such provident institutions as the National Deposit Friendly Society. It is the system so largely advocated in your columns as "payment for work done." But as all these three systems are methods of payment for work done I fail to see why this term should be applied to one system to the detriment of the other two.

3. *Payment by Contract for the Job as a Whole.*—This is the system in force in most of the friendly societies and medical clubs, and also in many of the part-time Poor Law and other State services. Now, any of these three systems may be satisfactory to the medical man, provided always that the rate of remuneration is adequate for the work required; and also that the work is not hedged in with such conditions as would make it irksome or intolerable for the medical man.

But these two provisos will almost certainly be absent if we allow the conditions of work to be arranged for us by lay bodies, whose object would be to get the work done somehow at the least possible cost. It is just because this has been done in the past that the ordinary run of "club" work now being done in the country has come to stink in the nostrils of the profession.

As to the relative merits of the three systems as methods of payment in a scheme to meet the foreshadowed State proposal, it is easy to discard the first. "Payment for time" might suit the State, but it would certainly be ruin to many practitioners in the country.

Between the other two the choice is not so simple as some of your correspondents seem to think. I myself would consider "payment for piecework," on the lines of the National Deposit Friendly Society, as greatly preferable to the present ordinary methods of contract practice, *if adequate security that the funds would never run short* could be obtained. But so far I have not seen any satisfactory suggestion as to a working method by which such a security could be assured. On the other hand, I know of no suggestion by any committee of the Association that the present system of club work, with its inadequate capitation fees and its intolerable control by lay bodies, should be supported by the Association. An improved system of "contract for the job" practice, with adequate fees and medical control, would have many supporters on the ground of the steady and reliable income produced. Such questions as to which system would give greater freedom of choice of doctor or which would more easily prevent abuse by the patient or by the doctor are, to my mind, minor considerations, and certainly are not worth the imperilling the unity of the Association.

Another system, which has been sometimes described as payment for work done, is merely a method of dividing the capitation fees amongst the doctors in proportion to the visits made by each. I have worked for a provident dispensary in which this was tried but given up in favour of the simpler system of giving to each doctor the capitation fees of all his own patients. The result of the change made practically no difference in the receipts of the individual doctors, and was certainly a great saving of trouble. This system must not be in any way confounded with the "payment for piecework" where a definite fee is to be paid for each visit, consultation, etc.

When the report of the committee of the Council on a National Medical Service is sent round to the Divisions, I would urge every member to consider the various proposals carefully and dispassionately; not to be carried away by meaningless party phrases applied to one or other suggestion; not to be influenced by threats of secession; to carefully think out what would be the conditions, under one or other system, in his own practice and in that of his medical brethren; also carefully to think out whether the system he favours would be likely to be accepted by the Government: and then to vote in his Division for the system that he honestly thinks would be for the benefit of the profession in general.

Lastly, I would most pressingly urge the members of the Gateshead Division, or any other members of the Association, even if their own views are not adopted by the majority, loyally to stand by the vote of the majority as if it were their own, so that we may present a firm and united front to the State or any other bodies with whom we may have to deal.

In this way, even if the suggested State proposals do not come to anything, we may have some chance of improving the position of medical men practising amongst the wage-earning classes.—I am, etc.,

Harrow, Nov. 5th. ALFRED H. WILLIAMS.

STATE SICKNESS AND INVALIDITY INSURANCE.

SIR,—I cannot help feeling that there is quite an unnecessary tendency at present for the Association to divide into two hostile camps on the question of the payment of fees under State sickness insurance, and threats like those of the Gateshead Division cannot but have a most damaging influence. Threats never convince, though they have often the unfortunate effect of embittering a controversy, which I am quite sure the Gateshead Division would regret. I want, then, with your permission, to make a suggestion with a view to getting something like union in the Association in its attitude towards the Government on this question of medical fees.

I start with the assumption that medical attendance will be provided by State insurance for the working classes, but it makes very little difference to the action of the Association whether it is or is not. The State is bound before long to take up the question of medical attendance for the poorer classes, as it can hardly resist the unanimous opinion of the Poor Law Commission that the matter is urgent, and if it is not dealt with under the insurance scheme, it may be on the lines of the Minority Report for a unified medical service under the health authorities. I sincerely hope with Dr. Keay that medical attendance will be provided by the in urance, on the ground that it tends more to foster that spirit of self-providence which is so beneficial. But in either case the British Medical Association must be ready, and it makes absolutely no difference to our schemes which method the Government proposes.

The present position of general practitioners is simply intolerable. In the poorer districts bad debts are often over 50 per cent., in spite of low fees, and in those districts there cannot be the least surprise that so many practitioners are ready to take clubs at almost any price rather than work for nothing. At the same time, every one condemns the clubs from the point of view both of the profession and the welfare of the public. It is in this universal detestation of the present club system that I see some hope of unanimity in the Association. I am quite sure that Dr. Buist will agree in this, and his letter in the JOURNAL of November 5th demands most careful attention, as it shows what, strange to say, so many have failed to see—the difference between friendly society club practice and any provident medical service under the control of the British Medical Association. It may, then, fairly be assumed that the Association will oppose to the utmost

any attempt of the State to hand over medical attendance under sickness insurance to the friendly societies. Even though a State subsidy might enable the societies to increase their medical fees, the fundamental point to which Dr. Buist refers—lay control by bodies interested in exploiting the profession—ought to, and I believe will, unite the whole profession against any State-aided extension of friendly society medical clubs. No one has greater admiration than I have for the splendid work done by the friendly societies in fostering self-providence, nor should I in the least object to a State subsidy to the societies, provided that, like the "Hearts of Oak," they give up their medical club departments. It would be better for the societies themselves in several ways.

A third assumption is that the insured themselves will demand a free choice of doctor. They have done so in Germany, and, in spite of the opposition of employers, are gradually getting it, supported by the whole medical profession, and there seems to me no reason for doubt that the general practitioners in England will in the same way be united in favour of free choice of doctor. If that is so, it necessarily involves determined opposition to selected whole-time or part-time medical officers at fixed salaries for attending indefinite numbers of the insured—a system that would destroy the practice of most general practitioners.

It appears to be quite necessary to remind certain Divisions of the present position, to prevent them forming premature opinions, as I believe the Gateshead Division has done. First of all, it is certainly the fact that many of the supporters of a provident medical service on contract lines under the control of the British Medical Association are not so bigoted in their views nor so wedded to contract practice as in some quarters they are supposed to be. The report of the Special Poor Law Committee was definitely called only an "interim report." It was quite understood to be incomplete. It only dealt with those aspects of the question on which the Annual Representative Meeting was in a position to give some guidance. But in addition to what came before the Representative Meeting, there are several other important points which the Divisions have still to consider, notably the question whether the Association shall approach the Government with a request for payment per attendance. I have no doubt whatever that the question will be placed before the Divisions in a perfectly unbiassed form, and personally I strongly resent the suspicions that have been expressed that there is an attempt to foist on the Association a capitation scheme. At any rate, I have seen no signs of such an attempt. As a contract scheme, the draft scheme of the Special Poor Law Committee seems to me to be the best that can be framed. It gets rid of what is infinitely the worst feature of club practice—lay control of medical officers elected as slaves of the persons that elect them—and it is a most unfair verbal quibble to prejudice the scheme by calling it "club practice." The difference is fundamental, and the one fact that it removes lay control puts the scheme in a totally different category from club practice.

Nevertheless, with that protest I am bound to say that I see some great advantages in payment per attendance. I only doubt whether it is possible to overcome the practical business administrative objections that are sure to be raised by a hard-headed Chancellor of the Exchequer. But why should we not try? As far as I can read the minds of members, very few of the supporters of the scheme considered by the Representative Meeting would oppose on principle payment by fee per attendance. They simply doubt whether the State can be expected to have such confidence in medical men as to trust them not to make unnecessary attendances, and while they rather dislike the "confidence trick," they recognize that the State Insurance Department will be a public trust which will be legally bound to take reasonable precautions against abuse through over-attendance. It seems to me to be quite unbusinesslike even to suggest the "private deposit" system of the National Deposit Friendly Society. The very cost of keeping two separate accounts for every one of the 15,000,000 persons to be insured would run away with much of the money that might go for medical attendance, to say nothing of the difficulties that would arise when a private deposit was exhausted. But there are several other safeguards against over-attendance that might be suggested, and after all it might not be impossible to persuade the Government that there would be some advantages to the public as well as to the profession if doctors were paid per attendance, with some reasonable supervision by independent whole-time medical inspectors, and I see no reason why we should not make the attempt. We should, of course, need to have a reasonable scheme, and I do not think I am breaking confidence when I say that the Special Poor Law Committee is considering such a scheme. We should need, too, to have unanimity in the profession. Here we must face hard facts. Suppose for a moment that the Association decided even by an overwhelming majority to ask for payment per attendance, and the Government refused and decided to appoint special whole-time salaried medical officers, what would happen? Can any one say that he does not believe that there would be numerous applicants for every post, in spite of any previous decisions in favour of free choice of doctor by the insured? I have as much confidence as most men in my fellow practitioners, but I believe we should then be almost helpless, unless we had another scheme which we could put into operation ourselves like the Provident Medical Service under the auspices of the British Medical Association. That could always be kept in reserve, and we could work it in spite of what are generally called "blacklegs." Moreover, any Government would pause before it decided on the appointment of special salaried medical officers, if it knew that we had a reserve scheme which did not depend on absolute unanimity in the profession, but which would include the best part of the profession.

What I suggest, then, amounts to this, that the Association should express its decided preference for payment per attendance and should urge this on the Government as most likely to give the most efficient medical service, satisfactory both to the public and the profession. If this were granted, well and good; but if this cannot be obtained, rather than accept a system of special appointments at fixed salaries or drift into the hands of the friendly societies, we should accept payment *per head* from the insurance department under the Provident Medical Service scheme drafted by the Special Poor Law Committee. Under that scheme it must be specially remembered that though the Government might pay *per head*, the local medical committees have complete local option as to whether the final distribution of the funds shall be *per head* or *per attendance*. If that were done, the experience thus gained as to the working of the system of payment per attendance would be extremely helpful if in the future we decided again to approach the insurance department for payment per attendance by the department. If this were granted at any time, certain clauses of the scheme laid before the Representative Meeting could easily be altered, leaving the Association with a medical service of its own, fully organized, which would place the profession in the strongest position to meet any contingencies.—I am, etc.,

Salford, Nov. 5th. J. H. Taylor.

Sir,—Dr. Keay compliments me for stating in "*plain* words" my objections to State insurance. This is, I fear, flattery—or is it veiled sarcasm?—for he evidently misunderstands, and asks various questions, to which my last letter should have afforded a sufficient answer, where, in my opinion, they are not irrelevant. In the first place, my objections were not to a State insurance, but to any *special* medical scheme being linked on to it. The object of the State in proposing an invalidity insurance is to insure the beneficiaries against *all* the demands entailed on them by "invalidity," of which medical attendance, though an important item, is by no means the only one. His first question is whether I personally am satisfied with the present system of medical practice in the country. I must leave it to your readers to say whether this is relevant to the matter at issue, but I have no objection to answering—not vaguely—in the negative. I do not see that this helps him very much in his arguments. I am fairly well acquainted with the past history of our profession for many generations, and am quite satisfied that there never was a time when every medical practitioner, or even the majority, were satisfied with the medical attendance then in vogue. I will even go further, and express an opinion that it is most unlikely there ever

will come a time when the satisfaction Dr. Keay seems to contemplate will have any existence, except in the minds of certain medical reformers who publish impossible resolutions, and are surprised that their brethren are not ready to swallow them immediately.

Dr. Keay asks what I mean by saying that "State insurance would deprive patients of the choice of a doctor." I did not say "State insurance," but, as I previously pointed out, any *special* scheme of medical attendance drafted into it would. State insurance of a legitimate kind would have the reverse effect. For if the beneficiaries could look for a larger income during "invalidity," they would have more wherewith to pay their own doctors' charges. It seems to me obvious that if poor people had to contribute for a special medical scheme they might be forced to give up their own private doctor or club, and make use of the doctor whom the scheme provided. In all probability they would have no choice at all in regard to that doctor, and even under the present debased club system it is admitted that a majority of the club do, as a matter of fact, choose their own doctor.

If I am blamed for introducing "probabilities" into argument, I may reply that my view as to what the Government will do is at least as reasonable as that which suggests the formation by the Government of a fund on the National Deposit Society's system to meet the bills of medical practitioners, set out according to Dr. Fothergill's formula of "payment for work done."

I am surprised that Dr. Keay does not see the—shall I say possibility?—of all works' doctors being seriously jeopardized by any scheme of the kind I have objected to. If deductions are to be made from the workmen's wages for a Government medical scheme, they will reasonably object to pay contributions for the works' doctor. Of course, the Government may employ the works' doctor in the same capacity, and pay him better; but it may not. If it did, it is difficult to see how the minority who object to the works' doctor will get any choice of doctors by the change.

With regard to analogies from German medical practice I express no opinion. I only have before me the information that has been provided by the Association and that contained in the *Encyclopaedia Britannica*, and these, to my mind, do not help very much. Even if reliable as to the conditions of medical practice in Germany, they might be altogether misleading when taking into consideration those existing in this country.

Dr. Keay speaks of the "glaring inconsistency of my position." Well, I can only leave that to your readers. His example is interesting. He says I have no objection to the working classes being compelled to provide for maintenance, but they must not be compelled to provide for medical attendance. If my words gave him that impression they must have been far from "plain." If the beneficiaries under an invalidity insurance scheme receive a weekly payment, why is it to be assumed that this money is only for maintenance? Why should not some of it be meant for medical attendance? My objection is to "earmarking" any portion of it for this purpose only. It should be left to the beneficiaries, who in this way will retain perfect freedom of choice of doctor.

I am aware that it has been urged that the working classes do not understand the importance of proper medical attendance, and might waste, or spend too small a portion of their insurance money on an inferior article. This may be a good argument for some purposes, but not for proving that in any other way they will get a *freer* choice of doctors. If they are to choose freely, they must be allowed to select good, bad, or indifferent doctors, and not be forced to have only the good ones.

Dr. Keay *entirely* agrees with my views as to the relations of the Poor Law Medical Service in this connexion. I hope this is without reservations, and that he does not misunderstand them.

Dr. Cooper seems to have grasped my meaning better. All my arguments are against a "State scheme run on contract practice lines," or *by means of salaried medical officers*. But as I do not believe in the practicability of any other scheme, I think it consistently explains my opposition to any scheme of State medical attendance.

I must apologize for the length of this letter, but it may save space in your columns if it prevents me from being called upon to explain the consistency of my position.—I am, etc.,

London, N.E. Nov. MAJOR GREENWOOD.

SIR,—Some days ago, in the daily press, an interview was reported between Mr. Lloyd George and representatives of the Manchester Unity. From this interview it would appear that the Chancellor has already a scheme of sickness insurance prepared, and that it has been submitted to the representatives of certain friendly societies and of the medical profession. Is the scheme that was printed and issued by the BRITISH MEDICAL JOURNAL a scheme modelled on Mr. Lloyd George's? If so, it were time prompt action were taken. A postal referendum to all members of the medical profession, having a set of questions similar to those proposed by Dr. Fothergill, would give a true idea of the opinions of medical men in this country. Such postal referendum should be carried out, and a chance given to general practitioners to express an opinion on this vital question—for to attend meetings is an impossibility with many. None of us wish to form a new association to protect ourselves, but weak action now on the part of the British Medical Association would compel us to do so in self-defence.

Let us, then, have prompt and vigorous action taken, and the entire profession—members and non-members—roused to the importance of the crisis; for many do not know, and we may yet save ourselves before it is too late.—I am, etc.,

Long Eaton, Nov. 7th. ERNEST MILLIGAN.

THE CORONERSHIP FOR CENTRAL LONDON.

SIR,—The report on page 1458 of your last issue, after naming the three candidates who survived to go before the Council for final selection, proceeds to state that "the Public Control Committee recommended Mr. Oddie for the appointment *as he had both a medical and legal qualification.*"

This clearly suggests that the committee might have failed to appreciate that I was also qualified in both professions.

I take it that, as a matter of fact, my friend Mr. Oddie was preferred to me for other reasons, no doubt excellent, but obviously not for that which your report advances—not that it matters, because Mr. Schröder was eventually preferred to either of us.

It would seem to be small encouragement to medical men to qualify for the Bar when a candidate who has not taken the trouble to qualify at all is the successful applicant. It must, however, be remembered that Mr. Schröder is a man of exceptional experience wedded to great ability, and I take this opportunity of congratulating him on his success, and the public on retaining the services of a servant so competent.—I am, etc.,

London, W.C., Nov. 7th. C. GRAHAM GRANT.

⁂ The following are the words used by the committee: "We have formed the opinion that Mr. S. Ingleby Oddie is the candidate best qualified for the appointment. Mr. Oddie has had considerable experience both as a barrister and as a medical practitioner."

CORONERS' LAW AND DEATH CERTIFICATION BILL.

SIR,—A few days ago I wrote to the M.P. for my district drawing his attention to the injustice which the passage of the Coroners' Law and Death Certification Bill would place upon the medical profession by forcing them under penalty to visit the corpse of every patient who died, within twenty-four hours, and sign the death certificate without fee or reward, not even carriage hire being provided. I pointed out that it might involve a journey of ten or twelve miles or more, to the exclusion of all other work, however pressing, perhaps in bad weather and over bad roads.

I also pointed out that there is only one class of the community (besides doctors) that is compelled to work for the State under penalty, without remuneration, namely, convicts, and I hoped that he objected to the medical profession being placed in this classification and would vote against the bill unless a just and reasonable remuneration was provided for professional work done for the good of the State.

I received a courteous and thoroughly sympathetic reply; perhaps if even a few medical men in each constituency would do likewise it might have a good effect.

For obvious reasons at present I withhold the name of the M.P., and therefore my own.—I am, etc.,

November 11th. "UNUS."

"COMPURGATION."

Sir,—Any advice from you always receives from me the most serious consideration. You advise me to read up again the subject of compurgation, and I have done so, with the result that my account of it scarcely needs modification. It is difficult to know exactly what took place in courts of justice such a long time ago, when shorthand writers were not; but it seems that, as far as is known, my account is accurate. There are, indeed, those who think that the compurgators did not directly testify to the accuracy of the statements made by their principal, but merely swore that he was a worthy person, whose statements were entitled to credit, and that if he said a thing was so, it probably was so. I trust I shall not be accused of "Berserk ardour" if I say that it was the kind of evidence that I should willingly have given in favour of you, Sir, before the publication of your leaderette on compurgation.

The obscurity that you find in the first sentence of my previous letter would scarcely be discovered without a combination of ingenuity and industry such as must be rare outside of your office.

I now gather that the reason you advocate the return to a modified system of compurgation, is in order to save me from an hypothetical discomfiture, in an hypothetical Homeric combat, with an hypothetical adversary, identified only as known to an hypothetical public, that reads the "Yellow Press," a publication with which I am not familiar, but which I am inclined to regard as also hypothetical.

There was an inhabitant of the ancient village of Gotham in Nottinghamshire, who burnt down his granaries for fear they might be struck by lightning. His example has not been generally followed, but there is much to be said in favour of taking ample precaution against contingent calamities; and as the alteration that you advocate in the law, seems to be for my special protection, it would be churlish indeed in me to oppose it. Nor have I offered any opposition to it. In the letter that you criticize with such acuteness and severity, I gave the proposal my unqualified blessing.—I am, etc.,

London, W., Nov. 8th. Charles Mercier.

INSURANCE ON THE CHEAP.

Sir,—I have been requested to forward you the following resolution, which it is hoped you will insert in your Journal. It was unanimously passed at the last meeting of the members:

> That the members of the Leicester Medical Union strongly disapprove of the new scale of fees proposed by the Pearl Life Assurance.

—I am, etc,

Douglas Bryan,
Honorary Secretary, Leicester Medical Union.

Leicester, Nov. 7th.

*** The question of the fees offered by the Pearl Insurance Company was dealt with in the issues of the British Medical Journal of September 17th, p. 801, and October 1st, p. 992.

DRAUGHTS.

Sir,—Strenuous efforts are now being made to induce people to improve the ventilation of their dwellings by opening doors and windows, which must often produce draughts, but so far as I am aware no reference is made to permanent ventilating openings in living rooms, so placed as to avoid draughts and inconvenience. Many years ago the health of the British soldier was so unsatisfactory that in 1863 the Barrack Improvement Commission was instituted to report on the soldiers' sanitary surroundings. Among other improvements as a result of the report, a scheme of permanent ventilating openings was framed by the War Office for barrack rooms, and the openings were so placed and arranged as to obviate draughts and other inconveniences and to render the ventilation of the rooms independent of windows and doors. The dimensions of the openings depended on the cubic contents of the rooms and the number of occupants in each, and they were, so far as possible, introduced into all old barracks, and, as a matter of course, into all new buildings. It is the opinion of those in a position to judge that this important system of ventilation has had much to do in the greatly improved health of the army.

With very few exceptions permanent ventilating openings do not find a place in the living rooms of the general population; and this applies to the mansion of the peer as well as to the cottage of the farm labourer, although permanent ventilating openings are in operation in all modern hospitals at least.

My proposal, therefore, is that the present energetic and able President of the Local Government Board should consider this question—decide on a suitable and inexpensive system of permanent ventilation for dwellings—submit the question to local authorities who must approve plans for all houses intended for human habitation; and I believe that in time the spirit of the system would operate extensively throughout the country.

There is another small matter about which a hint might be taken from army sanitation. All modern buildings to house soldiers have the surface of the ground under the boarded floors of the basement rooms covered with a thin layer of concrete and rubble. This does not, as a rule, form part of civil building regulations; yet many sanitarians think that as it tends to keep down dampness, it has an important bearing in preventing the predisposition to tubercle. It is not expensive.—I am, etc.,

November 1st. Surgeon-General.

THE CAUSES AND TREATMENT OF DYSMENORRHOEA.

Sir,—Having read the paper of Dr. Herman on the above subject in the Journal of October 22nd, I trust you will find space for a few comments. I think the profession are fairly well agreed that the *cause* of dysmenorrhoea has not been determined; indeed, Dr. Herman says himself:

> I know nothing about the cause or causes of dysmenorrhoea.

And what we have to determine now (not knowing the exact cause) is what means of relief we can afford the patient. Dr. Herman says:

> The cure of dysmenorrhoea is by dilatation of the cervix;

and quotes the experience of Dr. Mackintosh, who cured (?) 24 patients out of 27. *If dilatation is the best cure, why not keep up the effect of the dilatation long enough to permanently cure the patient!* This can be effected by the use of my wire spiral stems, open from end to end, flexible, and self-retaining, and which not only keep the cervical canal patulous, but also, by acting as a drainage tube, allows any membrane to escape. I have known several who have shown me such after a period was over, but while wearing the spiral wire stem had *no pain and no membrane!* showing the value of dilatation and drainage. Dr. Herman describes a case:

> Married at 25; when 26 cervical canal dilated; after this she menstruated three times without pain! when the pain returned.

Why? I venture to say, from my small experience, had a spiral wire stem been introduced directly after dilatation in this instance, the pain should not have returned three months after, *nor for so long as stem was worn.* Is a patient such as the one described to go on taking guaiacum till the menopause? Dr. Herman thinks a stem a "very dangerous way of dilating the cervix," but his objection is not at all convincing. I know several gynaecologists who will bear me out in saying they have met with no fatal cases from the wearing of the stem, and some of my own patients have ridden on bicycles without any consciousness of its presence. Dr. Heywood Smith described an interesting case in the *Medical Press and Circular*, October 28th, 1908, in which he has removed the left ovary for severe dysmenorrhoea. He says:

> The patient has now worn Duke's spiral wire stem with the greatest relief for five and a half years at intervals.

What about the "impossibility of keeping the stem aseptic while its lower end remains in the vagina?" (The lower end of the cervix is in the vagina.) The late Dr. More Madden of Dublin constantly used my spiral wire stems after dilatation (and has borne testimony to their freedom from risk, and value, both in the *Lancet* and the *Medical Press*) *more than ten years ago.* My treatment for dysmenorrhoea is *dilate and keep canal patulous*, the drainage being a most important factor, giving freer exit to membrane. "When it appears in large pieces, or becomes rolled into a ball," as described by Mrs. Scharlieb, ordinary cleanliness by douche or syringe, during the periods while the stem is worn will keep it from becoming plugged, and as the

patient wearing it can go about her ordinary vocation, and not be confined to bed, the mental effect will also contribute to the cure, which in neurotic females is a consideration. To compare a "flexible spiral wire self-retaining stem" with a rigid implement which the patient could not go about with is not fair, nor should stems be condemned *in toto*. It was in the Seventies I had seen and myself divided a good many cervices for dysmenorrhoea, but finding the os quite as contracted a month afterwards, led me to design my flexible wire stem, and as Dr. Herman says, "Dilatation did cure her" (case quoted), which applies to several, I am sure, treated in this way. Dr. Herman's statement, "that stem pessaries were by others happily little used," should have been at least qualified by stating *which form of uterine stem he alludes to*.—I am, etc.,

London, W., Oct. 21st. ALEXANDER DUKE.

STRANGULATED OMENTAL HERNIA WITH FEW SYMPTOMS.

SIR,—Other surgeons will agree with me in complimenting Mr. Cressy on his prompt action and deserved success in his operation on the case of omental hernia described by him in the JOURNAL of November 5th, 1910. The hernial tumour and the local discomfort were everything and evoked his practical appreciation, which steered him straight.

The absence of symptoms at all suggestive of strangulated or obstructed intestine is very noteworthy, and recalls a prolonged discussion, which I will not here repeat, but in which I took part years ago. I now give only the references, in case Mr. Cressy or others care to look them up, all dealing with the question of omental strangulation, in the *Lancet*, as follows:

1876, August 12th, p. 219, paper by me.
1883, July 21st, p. 107, review of a pamphlet of mine.
1883, July 28th, p. 164, my comment on the review.
1883, August 4th, p. 211, letter by Mr. Timothy Holmes.
1884, May 17th, p. 881, my reply to Mr. Holmes.
1885, April 11th, p. 680, letters from Mr. Holmes and myself.
1885, April 25th, p. 772, letter from Mr. F. Treves.
1885, May 16th, p. 902, my final reply.

The conclusion I maintained and still adhere to is that "there can be no such thing as symptoms of intestinal obstruction brought about solely by constriction of omentum."

The symptoms of strangulated hernia are, of course, those of intestinal obstruction; and, while it is well known that strangulated omental hernia may more or less resemble strangulated intestine, it does not seem to be sufficiently seen that when symptoms exist at all they are due to incidental intestinal derangement, and not to the mere omental constriction.

All this is fully considered in the discussion alluded to, and to which I must refer any one who wishes to pursue it further. But I may take this opportunity of quoting a private letter from Sir James Paget, whose opinion on the whole question I asked at the time:

March 12th, 1886.

Dear Mr. Parker,—

I am obliged to you for again sending me some of your papers. I think you make it clear enough that the symptoms which have been ascribed to "strangulated omental hernia" are not due to the mere constriction of a piece of omentum or to any reflection from nerve centres thus impressed. But before deciding to which of many probable conditions the symptoms may in each case be ascribed, I think it will be necessary to collect many cases observed and recorded without the supposition that the constriction was enough to explain all that happened.

Very truly yours,

JAMES PAGET.

What strikes me as very remarkable in Mr. Cressy's description is the "black" colour he found in the altered omentum. Was it actually black and necrosed, or a dark series of composite tints? In the *Lancet* for November 26th, 1898, I reported a case of umbilical hernia with putrid abscess and gangrene of omentum, apparently starting from a slough of the skin, infecting the sac and contents. But the gangrenous omentum was grey, not black, and the symptoms were those of acute putrid abscess and associated fever, without reference to intestine, which was not present or concerned. In Mr. Cressy's case I do not understand the existence of black gangrene of omentum inside the peritoneum at all, unless by some chance a gangrenous microbe had reached it from the intestine. The single vomit might by some be conceivably attributed to that; but how slight an effect from a condition one would expect to set up a serious toxaemia! The short attack of "gripes" might have resulted from a drag on the colon, causing this temporary discomfort. But even these two symptoms did not alter the pulse, temperature, or intestinal functions.

I have seen in constricted omentum an assortment of colours, purple, crimson, yellow, green, with induration evidently due to simple inflammation; the colours being similar to those of bruises in the skin, but more brilliant. Is it possible that something of the kind of an intensely congestive nature was there? I hesitate to question Mr. Cressy's anatomical description, given on the spot, but I known how fallacious some of these changes are apt to appear; and they are very seldom seen by any one.

In any case he need not be surprised at strangulated omentum existing without symptoms of strangulated bowel.—I am, etc.,

Liverpool, Nov. 6th. RUSHTON PARKER.

ALCOHOL AND OXYGEN.

SIR,—In reference to the very interesting communication of Professor Collingwood and Dr. Willcox, may I state that I am contriving a little apparatus by means of which the alcohol can be given in varying dosage? A metal cylinder contains an incandescent lamp; over this is placed a jet containing water and a percentage of alcohol, which can be varied. The oxygen is led through this box, is warmed, and takes up water vapour and alcohol. A small metre indicates the required current of oxygen, and my little oxygen mask is used to give the oxygen and alcohol. Messrs. Down are making this apparatus.—I am, etc.,

London, E., Nov. 7th. LEONARD HILL.

THE HEARING AFTER "OTECTOMY."

SIR,—Though indisposed to join in the discussion going on in your columns on this subject, the incorrect quotation by Mr. Faulder White of remarks of mine in the *Lancet* in 1906 seems to call for some correction.

In the JOURNAL for November 5th he says:

> Mr. C. Heath wrote in the *Lancet* (August, 1906) to the effect that otologists were agreed that the only cure for suppurative otitis was a radical mastoid operation.

I will just quote one sentence from the article he refers to:

> Far be it from me to suggest that the radical operation will no longer be needed; it will still be of use for those whose hearing has been entirely destroyed, or whose disease has not been found amenable to the treatment herein described, which by avoiding the removal of any part essential to hearing permits such prospects of retention of the hearing power as the radical operation, associated as it is with its removal of drum and ossicles, cannot possibly afford.

This sentence surely goes to show that the radical operation damages the hearing by removing the drum and ossicles, and as the proceeding which Mr. Faulder White is advocating also removes them, it is open to a similar objection—that it inevitably leaves a deaf person.

The object of my article was chiefly to point out that if another and less destructive method of treatment were carried out at the proper time, there would be no need for such operations as always leave deafness.

It appears to me that discussions such as these are more effectively carried on in the Section of the Royal Society of Medicine which is devoted to this work, and it would be well if Mr. Faulder White acceded to the suggestion of Mr. Macleod Yearsley and Dr. William Hill to that effect, in order that this perennial dispute may there be settled as far as our present knowledge will permit.—I am, etc.,

London, W., Nov. 8th. CHARLES J. HEATH.

COMPLEMENT DEVIATION IN DIAGNOSIS.

SIR,—In your leading article on this subject in the JOURNAL of November 5th you point out advisedly that "there is a regrettable tendency at the present day to throw more and more responsibility on laboratory aids to diagnosis, at the expense of clinical methods." A case

which I have recently had under observation bears out this fact, and, if it does not throw doubt upon the value of the Wassermann reaction as an aid to diagnosis, at any rate shows the danger of attaching too much importance to laboratory reports. The case in question was originally diagnosed as malignant disease of the throat. There was no history nor sign of syphilis, but, according to the laboratory report, the blood gave a positive Wassermann reaction. This report, combined with improvement under treatment by iodides and mercurial inunction, led to the supposition that the case might possibly be syphilitic. However, the improvement was only of short duration, and the patient died a few months later from sloughing carcinoma. In this case, therefore, the laboratory report simply had the effect of putting one on a false scent, and causing one to doubt the clinical evidence—a most unfortunate effect, when we consider the difference in prognosis between syphilis and cancer.—I am, etc.,

London, N.W., Nov. 5th. C. F. Marshall.

SHIP SURGEONS.

Sir,—From Dr. Rentoul's medico-political experience I expected a more sympathetic criticism in the Journal of October 15th of Dr. J. F. Elliott's endeavour to raise the status of ship surgeons.

While belittling Dr. Elliott's efforts, he incidentally slights his own profession by repudiating its dignity, and classifying the calling of medicine with the occupations of "rat catcher" and "sewer cleaner." Intemperate utterances of this description bring their own condemnation, and of course Dr. Rentoul merely speaks for himself.

As the Journal is frequently read by the laity, I should like, through its columns, to maintain that, as a class, the medical profession has as much right to dignity, corporate and personal, if not more so, than any of the other learned professions. The dignity of medicine is not a mere shibboleth—it is a tangible asset, valuable the more practitioners live up to it. In short, the more dignified the doctor is in bearing and conduct, the greater his influence to benefit the community in which he is placed.

It is an interesting coincidence that in the same copy of the British Medical Journal in which Dr. Rentoul's letter appears two references are made to "the dignity of the profession"—one on page 1174 and the other at page 1190. Both of these references bear me out that the profession as a whole is conscious of its right to be regarded as a dignified calling.

To return, however, to the subject of Dr. Elliott's attention. Those of us who have personal knowledge of his ability as a practical reformer know he can be trusted to hit the target if within the range of possibility. The British Medical Journal already bears record of many contributions of value from his pen.

It cannot, however, be gainsaid that Dr. Elliott has taken up a difficult task when he grapples with the problem that the late Surgeon-Major C. H. Leet, of Liverpool, after years of endeavour, failed to solve. Nor is the reason of it far to seek. Practice afloat is regarded as a holiday trip, an inexpensive way of deriving experience of travel with benefits to health. Ship surgeons seldom or never look upon their berths as permanent Both employer and employed—particularly the employer—regard the professional services rendered as nominal, and the remuneration is fixed at a scale commensurate with easy responsibilities.

It is true occasions do arise when exigencies demand services of a high order. Such exigencies are, however, very rare. The young medical man is out for a pleasant voyage, and after the first few days at sea usually has it. Were it otherwise the companies would have difficulty in filling the medical vacancies as they arise. Experience shows there are plenty of junior men to supply the demand.

In conclusion, I would suggest that if Dr. Elliott and his committee were able to formulate and get the companies concerned to establish a regular Mercantile Marine Medical Service on lines similar to the Medical Department of the navy, serious professional men might be attracted to the career of a ship surgeon by the prospects of continuity of employment and gratuity or pension on retirement. So long, however, as vacancies can be filled by any inexperienced novice who can produce a registration certificate so long must the status of ship surgeons remain as at present.—I am, etc.,

Dublin, Oct. 21st. S. Wesley Wilson, Ex-Surgeon Dominion Line.

ARMY AND NAVY MALE NURSES' CO-OPERATION.

Sir,—During the last few years an institution known as the Army and Navy Male Nurses' Co-operation has been in existence, located at 47B, Welbeck Street. It was founded by Miss Ethel McCaul, R.R.C., assisted by a representative and influential committee. The present Naval Medical Director-General has all along given us his material support and generous consideration.

The object of this co-operation is to afford to the public thoroughly trained male nurses and sick attendants of assured good character, and to provide employment for members of the sick berth staff of the Royal Navy and retired non-commissioned officers and men of the Nursing Section of the Royal Army Medical Corps.

The merits of the object of this co-operation quickly secured the patronage of Her Majesty Queen Alexandra.

The vice-patrons and patronesses of the co-operation comprise the heads of the navy, the army, and the medical profession, and include the Directors-General of the Medical Department of the Navy and the Army.

The officers of the co-operation are: *President*, Sir Frederick Treves, Bart., G.C.V.O., C.B.; *Chairman*, Sir William H. Allchin, M.D.; *Vice-Chairman*, Dr. Howard Tooth, C.M.G.; *Honorary Treasurer*, Dr. Horton-Smith Hartley, M.V.O.; *Honorary Secretaries*, Miss Ethel McCaul, R.R.C., and Fleet Surgeon A. E. Weightman, R.N.

The Executive Committee is composed of the following ladies and gentlemen: Rowland Bailey, M.V.O., I.S.O., Miss Becher, R.R.C. (Matron-in-Chief), Anthony Bowlby, C.M.G., F.R.C.S., Hon. Florence Colborne, Deputy Inspector-General T. J. Crowley, M.D., R.N., Major Ferguson, D.S.O., R.A.M.C., Dr. Horton-Smith Hartley, M.V.O., Mr. R. Martin Holland, Miss Ethel McCaul, R.R.C., The Countess Roberts, C.I., R.R.C., Dr. J. S. Risien Russell, Charles Stonham, C.M.G., F.R.C.S., Colonel Sir Edward Ward, K.C.B., K.C.V.O., Fleet Surgeon A. E. Weightman, R.N., Lieutenant-Colonel E. M. Wilson, C.B., C.M.G., D.S.O., R.A.M.C., Miss Evangelina E. Harte, R.R.C., of Queen Alexandra's Royal Naval Nursing Service.

A considerable amount of success has been secured by those interested in the co-operation, which has now become nearly, if not quite, self-supporting. The nurses of the co-operation have secured most eulogistic testimonials from those who have obtained their services. Their services have been so highly appreciated that many have left the co-operation, having obtained permanent employment through its means—to us a highly desirable result if they continue to act as nurses. It would be a great pity if the services of such men as nurses should be lost to the country.

London is at present the only centre of this co-operation, which we recognize is still in its infancy. It is capable of far wider extension. The success we have so far attained warrants us in the belief that we have only to make ourselves known sufficiently well to the public in general and to the medical profession in particular to be able to supply all the needs of the country for male nurses who, by having served their country in its time of need, have earned the right of full recognition of their great merit, and it is only to be realized by the public that through the navy and army alone they can obtain fully trained male nurses.

As supplementary to the above remarks, I, as a retired naval medical officer, should like to add some others from intimate knowledge. I served on the active list for a little over twenty years and during that time met a larger number of the naval sick berth staff than is usual by men of my standing. I never had to report a sick bay man during the whole time of my service. Peccadilloes there were, but of so little importance that I can hardly remember the most important of them; that they were awarded a severe lingual castigation I have not the slightest doubt, but fortunately oblivion comes to my aid. That the sick bay man is a good, honest, hard-working, and efficiently-trained man I and all others who know him will maintain at all costs; he is indeed an example of what the world

knows as the handy man. The ruthless and relentless process of weeding out insures that a sick bay man who has earned his pension at the end of twenty-one years is thoroughly well worth the salt he has earned to savour his porridge. To enable such a man to continue to practise his particular work is of supreme importance: he may be wanted, and when wanted he will be a saviour in his country's need, and he will be wanted very badly. I ask for employment for the retired men of the sick berth staff, such employment as will keep them fit for service as sick bay men should the "horrid cause" arise. All who wish the country well in these troubled times will assist and wish us well.—I am, etc.,

A. E. WEIGHTMAN,
Fleet Surgeon, R.N.

October 24th.

PUERPERAL FEVER.

SIR,—In discussions on puerperal fever, such as that printed in the JOURNAL of October 22nd, it is always assumed that it is by vaginal examinations that the infection is introduced. Two cases of severe puerperal fever, one of them fatal, have come under my notice, in neither of which was any vaginal examination made; and these have led me to believe that there is another source of infection to which too little attention is paid—namely, the dressing applied to the vulva after parturition. In the fatal case above mentioned these were the ordinary napkins, which in this instance were proved to have been handled by persons with suppurating fingers; the fact that the first rigor did not occur till the sixth day supports the hypothesis of a *post-partum* infection. In the other case the patient herself had been attending to a child's suppurating scalp, and had probably contaminated her own skin or her napkins. Here fever began on the third day, but with her also no vaginal examination had been made.

The prevention of such cases lies in a proper cleaning of the patient's skin before parturition, and in applying dressings afterwards in a manner at least approaching that used after operations; cotton-wool soaked in an antiseptic, such as 1 in 2,000 biniodide of mercury, is a convenient and suitable dressing. I think it is quite possibly the neglect of these two precautions which is responsible for the continued mortality outside lying-in hospitals of something like 1 in every 450 parturient women.—I am, etc.,

F. C. BOTTOMLEY, M.D.

Bournemouth, Oct. 24th.

ETIOLOGY OF IRITIS.

SIR,—To generalize upon the question of the etiology of iritis does not seem to me to be possible. The cases vary, as with other diseases of the eye, according to the environment, the habits, the diathesis of the patients from whom the ophthalmic surgeon derives his statistics. In hospital practice this is markedly so. Thus the statistics from time to time published in respect to the frequency of the various causes of iritis cannot be accepted as indicating a common or a universal rule; the most that can be said of them is that they represent merely individual experience. The confirmation of this has already been shown in the correspondence which you have published upon this subject, and especially so as far as the alleged frequency of syphilis as a cause of iritis is concerned. Twenty-five years and more ago, according to my observation, it was not only common to see syphilitic iritis of one eye among hospital patients, but it was not uncommon to find the disease present in both eyes. Nowadays, however, again according to my observation, it is comparatively rare to meet with monocular syphilitic iritis, while double syphilitic iritis is practically a pathological curiosity. The cause of this I believe to be due to a modified virulence of the syphilitic virus, to improved methods of treatment of the primary infection, to a diminished frequency in the incidence of the disease. When, therefore, we read that an American surgeon records as much as 75 per cent. of his cases of iritis as due to syphilis, one can only suppose that something must be at fault with the environment of the patients from whom his cases are derived. But while the facts are such as I have stated, according to my observation, in respect to syphilitic iritis, the cases of so-called rheumatic iritis—those in which a history of a previous gonorrhoea can be obtained in men, and in which syphilis as a cause can be absolutely excluded—are undoubtedly common, so common as to form by far the largest series of cases of iritis. It goes, of course, without saying, that since syphilitic iritis is a manifestation of the so-called secondary period of syphilitic infection, it is essential to the diagnosis of the ocular disease that evidence of active syphilis should be present elsewhere upon the body. In these cases the iritis is merely an incident expressive of the activity of the virus, the chief manifestation of which appears upon the skin.—I am, etc.,

PERCY DUNN.

London, W., Oct. 21st.

MECHANO-THERAPEUTICS AND DISEASE.

SIR,—We have read with great interest the paper of Dr. Bryce entitled, "Mechano-Therapy in Disease," and the excellent leading article on the Undeveloped Land of Medicine which appeared in the BRITISH MEDICAL JOURNAL of September 3rd.

It is greatly to be regretted that the medical profession in this country has largely neglected mechano-therapeutics—a fact well illustrated by the absence of any section in the Royal Society of Medicine and the meetings of the British Medical Association, dealing specially with the subject. Members of the lay public who have heard of Swedish treatment, mechano-therapeutics, massage, or allied forms of treatment, have in consequence come to regard such methods of healing as being outside the domain of the regular medical profession, and have gone to unqualified practitioners to obtain them. Medical men are compelled, as a rule, to send their patients to an unqualified exponent of mechano-therapeutics if they desire to have the latter form of treatment carried out. The inevitable result of this state of affairs is seen in the present large army of unqualified practitioners of mechano-therapeutics. A small proportion of the latter are doubtless well qualified to carry out such treatment, but on the other hand the vast majority are not, and their presence in reality but exemplifies the old adage that imitation is the sincerest form of flattery.

There is only one remedy. The profession must take mechano-therapeutics into its own hands. The subject should be taught at the universities and medical schools as part of the regular curriculum, instead of being practically neglected as it is now. The treatment of difficult cases should be carried out by the medical attendant personally, or under his immediate personal supervision. Simpler cases might be confided to unqualified practitioners with occasional visits, as the case demanded, from the medical man. But in order to allow the latter alternative to work smoothly, safely, and without abuses, a teaching institute should be provided in which would-be unqualified practitioners of mechano-therapeutics could be thoroughly instructed, both theoretically and practically, in this branch of medicine. The General Medical Council should exercise control over all the diplomates of the institute, and issue a register of their names and addresses on the lines of the *Medical Register*. The diploma of the institute might be granted after examination alone to unqualified practitioners of known repute and standing of some definite number of years.

The need for proper teaching and training in mechano-therapeutics has been recognized abroad, but nowhere more than in Sweden, where the Royal Central Gymnastic Institute, founded in 1813, provides a three years' course (two years in the case of lady students) of Swedish gymnastics; this includes, of course, both medical gymnastics and massage. The institute and its diplomates are under the jurisdiction of the Swedish General Medical Council.

The need of proper legislation and control in the unqualified practice of mechano-therapeutics was never so strong as it is to-day.—We are, etc.,

EDGAR F. CYRIAX, M.D. Edin.
RICHARD J. CYRIAX, M.R.C.S., L.R.C.P.

London, W., Oct. 17th.

MR. ABRAHAM HOSKINS, M.R.C.S., L.S.A., of Sutton Coldfield, Warwick, who recently died at the age of 87, left estate valued at £47,330 gross, with net personalty £45,943.

Medico-Legal.

ABRAHAMS *v.* SNOWMAN.

Action Against a Medical Man.

In the High Court of Justice, King's Bench Division, the trial of the action of Abrahams and Another *v.* Dr. Jacob Snowman was concluded before Mr. Justice Ridley and a special jury on Monday, November 7th, 1910.

Sir Frederick Low, K.C., and Mr. Eric Dunbar, instructed by Mr. G. A. Wigham, appeared for the plaintiffs.

Mr. Hume Williams, K.C., M.P., and Mr. Hugh Fraser, instructed by Messrs. Hempsons, solicitors to the Medical Defence Union, appeared for the defendant.

Sir Frederick Low, in opening the case for the plaintiffs, said it was one somewhat unusual in its circumstances. The parties to the action were all members of the Jewish religion, which, by a most ancient institution, decrees that the male children at a very early stage of their career, should undergo the rite of circumcision, and it was as to the manner in which that operation was performed on one of the plaintiff's children by, or under the direction of, the defendant that this action arose. There was a charitable society known as the Initiation Society, established for the purpose of carrying out this rite among the Jewish people, and the defendant was a member of that society. Upon receiving notice he called and pronounced the child of the plaintiffs to be healthy and fit to undergo the operation and on May 15th it was performed by a gentleman named Snadon, who was qualifying for the position of a Mohel, under the supervision of the defendant who expressed himself as satisfied with what had taken place. The child was then taken to the mother. Later in the day the society's nurse, in making the necessary change, found there was a good deal of haemorrhage. The defendant was sent for, but was not at home, and another medical man was called in to stop it. It was alleged that this haemorrhage took place by reason of the negligent performance of the operation. The child, who at its birth was a healthy child weighing some 13 lb., gradually wasted until when it was taken to the hospital in July last it weighed only some 6 or 7 lb., a condition of things which plaintiff alleged was brought about wholly by the excessive haemorrhage from which the child had suffered. If, as he hoped to satisfy the jury, the child had been rendered practically an invalid for a very long period, then, of course, he contended the plaintiffs would be entitled to substantial damages to compensate them for the disability that had been brought to the child by the negligence of the persons who had performed the operation. Further, the plaintiff claimed for loss of his wife's services in having to remain at home and nurse the child, and for special nourishment some £84 as special damages which they claimed in addition to the reasonable and proper compensation if they established the negligence of the defendant or the person acting under his control.

The plaintiff and a number of other witnesses were then called substantiating the statements outlined by the learned counsel in his opening.

Dr. W. L. Brown said the child was very weak, both physically and mentally, and was suffering from marasmus, which in his opinion was brought about by excessive haemorrhage, resulting from the operation. In his opinion the haemorrhage had been brought about by the severance of the fraenum and the severing of an artery in doing it.

Cross-examined by Mr. Hume Williams, he said the severance of an artery during an operation would be immediately perceptible.

Dr. Thomas William Humphries, of 143, Victoria Dock Road, corroborated the evidence of Dr. Lawson Brown.

Dr. Frederick Thompson, Medical Officer to the Hospital for Children, Great Ormond Street, said the child was brought to that institution. He was informed by the parents that there had been haemorrhage when it was circumcised. The child was wasted and had been injudiciously fed, and had slight bowel irregularity. Its weight was below the normal, but under treatment and proper advice as to feeding had steadily improved, and when finally discharged from the hospital was some 3 lb. heavier than when it first came. Even assuming that there had been severe haemorrhage he did not think it would have a permanent effect.

Mr. Hume Williams applied for and obtained permission for the defendant and his medical witnesses to examine the child.

Mr. Hume Williams said that the accusation against the defendant was a perfectly groundless one. The operation of circumcision in the Jewish faith was to the Jews a deeper meaning religious rite which up to recent years was always performed by the clergy of the faith as part of the religious ceremony without, he feared, due observance of the rules of sanitation which had grown up with the twentieth century. In order that the operation should be performed with due regard to those laws, and brought within the reach of the poor, the Initiation Society was formed. It was a society which originally dated from 1745, but it fell into disuse and had recently been resuscitated. It was under distinguished patronage, and was formed for the express purpose of providing that those who were called upon to perform the ceremony of circumcision should have the proper qualifications, and this was the first action of this nature which had ever been brought against a medical officer of the society. The rules of the society provided that the rite was to be performed under certain conditions, namely, in the presence and under the direct supervision of a competent medical officer or by a person called a Mohel, who had passed an examination by the medical board and obtained a certificate to comply with all modern surgical conditions. Mr. Snadon attended the plaintiff's child in company with Dr. Snowman, and performed the ceremony under his supervision and to his satisfaction. Some days afterwards he was informed that he had been sent for, and it was desired that he should go and see the child, which he did. He examined it and found there had been some retraction and loosening of the bandages in consequence, which he rectified and left, calling subsequently to see that everything was perfectly satisfactory. He left the child on May 16th, and never heard anything more about it until August this year. He suggested it was absolutely impossible to credit the case as presented by the plaintiff and that the claim had been wickedly and grossly exaggerated by somebody, and that the child had only been suffering from marasmus, which 80 per cent. of the children of the poor suffered from, and which had been brought about by malnutrition. The defendant and his medical advisers had had an opportunity of examining the child, and they would say that the case which was made on behalf of the plaintiff by Dr. Brown in the witness-box for the first time, namely, that there had been severance of the fraenum and some skin left behind which ought not to be there, was not true. There was a little skin left there, as not so much had been taken off as in some cases. There had been no division of the fraenum, and he would ask the jury to say that this was a case which had been trumped up and ought never to have been brought. The case was an important one to the doctor, as it was to the society. If the defendant had been negligent, the society would have to bear the consequences.

Dr. Jacob Snowman gave evidence bearing out counsel's statement. He said that Mr. Snadon had had both practical and theoretical instruction for some two months in the operation of circumcision in various cases. He described the operation on the plaintiff's child, which was done to his entire satisfaction. There was no bleeding of an abnormal character at the time. When he subsequently examined the child he found there had been retraction which was the cause of the bleeding; this he attended to, and it immediately ceased. He saw the child subsequently in September, when it was suffering from malnutrition, and he took the opportunity of examining the local condition and found it was satisfactory. He had seen the child that day; it was an underfed and badly nourished child, and he was able to discover one objectionable symptom, namely, that the child had an enlarged gland of the groin, probably of a tuberculous nature. He examined the fraenum, of which there was absolutely no severance whatever.

Cross-examined by Sir Frederick Low: The rules of the society provided that the operation was to be performed only by a registered Mohel. He believed he was the only registered Mohel present at the operation under his (Dr. Snowman's) supervision. There was not much haemorrhage when he saw the child, but it was serious, as if it had not been arrested the child might have died. In his opinion, in cases of severe haemorrhage in children, once the bleeding was arrested it made very little difference to their future development.

Dr. Richard N. Bateman, Dr. Gustave Michael, and Dr. Maurice Clifford corroborated the defendant's evidence, and Mr. Abraham Snadon having been called, learned counsel addressed the jury on behalf of their respective clients.

His Lordship, in summing up, described the case as a grossly exaggerated one, to say the least. It was essentially a case for the jury to decide. If in their opinion the child's condition was brought about by reason of the negligent manner by which the defendant performed or assisted at the operation, then their verdict would be for the plaintiff and they would have to assess the damages.

The jury immediately returned a verdict for the defendant.

WORKMEN'S COMPENSATION ACT.

Injury to the Toes Causing Incapacity.

In a case at Wigan (September 6th) it appeared that on December 31st, 1908, plaintiff had five toes crushed through a barrel falling on him. Gangrene set in and he had to have his toes amputated. There was some suppuration for a considerabe time, and in March plaintiff expressed a desire to resume work, but when put through some muscular exercises the foot broke down again, and he was unable to work until the beginning of August, when he applied for light employment. He contended that having lost the support of the arch of the foot he was unable to follow his previous employment, which necessitated the lifting of heavy barrels, and the unloading and loading of barrels down steep cellar steps, said to have small treads, which, it was contended, would make plaintiff become flatfooted so that he would have to walk on his heel. Applicant said he thought farm labouring would be suitable employment for him. He could earn 18s. a week at that.

Dr. Fletcher said the arch of the injured foot was weakened, and plaintiff was not suitable for carrying heavy weights. Witness had endless trouble to heal up the wound. Lifting heavy weights would affect the arch of the foot, and the plaintiff might become flatfooted.

Dr. Blakemore, who was called by the respondents, said the applicant in his opinion was able to do the work that he did before the accident. He did not see that the injury had interfered with the arch of the foot at all. If the man wore a pad in his boot it would obviate any possible effect on the arch.

Dr. Fletcher was asked by His Honour whether he thought applicant could do the work if he wore a pad. He replied: "I do not think you ought to ask him to. He could not do it with safety and efficiency."

Dr. Blackmore added that it was not necessary to have toes to bear a weight.

His Honour said what he had to guide him was the medical evidence; but while one doctor affirmed with great confidence that the man's foot was so injured that he could not carry heavy weights, the other doctor with equal confidence said the man could do his old work as well as ever. As the skilled witnesses upon whom he was asked to rely contradicted each other, he was left practically with no evidence at all. That was the general experience. When he got expert evidence it was contradictory, and he was no wiser for it. Therefore, disregarding the evidence of the two gentlemen, he was left simply with the fact that the man was injured. The man had certainly received some injury which must be detrimental to him, at least at present, and he (His Honour) would hold that his earning capacity was not more than 18s. a week. The difference between 18s. and 25s. was 7s., and there would therefore be judgement for the respondents to pay half that amount—3s. 6d. per week—until further order, from August 6th. The respondents must also pay costs.

CLAIM AGAINST A HOSPITAL.

IN the Court of Sessions at Edinburgh on November 4th a claim for damages against the Greenock Infirmary was dismissed with costs. The claimant alleged that, owing to lack of skill and reasonable care, she had been treated only for a sprain of the knee, whereas really, she alleged, she had a fracture of the thigh as well. The Court dismissed the claim on the same general grounds as those which have proved fatal to all similar claimants during the last few years; this is, that the governors of institutions, providing they exercise reasonable care in the selection of a medical staff, are not responsible for the actions of the latter, these not being their servants. In this particular case an unsuccessful endeavour was made to get round the difficulty by asserting that the fact that the patient had been admitted on a payment of two guineas a week established a special contract—namely, one which implied not only that the treatment should be given by competent medical men, but that it should itself be careful and skilled.

"BOOKING FEES."

C. P. B. asks whether it is usual to charge "booking fees" where a practitioner has entered a midwifery engagement in his book on the condition that he is to be paid a certain fee if called upon by the midwife in charge of the case. He has often entered such engagements in the case of members of the working classes, but has never charged a fee.

*** We have never heard of such fees being charged, though, in the circumstances, such a charge does not appear unreasonable. The arrangement precludes him from accepting another engagement, and may have no other result.

MEDICAL INSPECTORS AND FAMILY DOCTORS.

M. X. writes that the parents of a child 6 years of age have been ordered to submit their child for examination at the local school, and that, failing to, the medical inspector will visit the home of the child to examine him.

*** We know of no authority that gives power to a school medical inspector to visit the home of a child under the care of a duly registered medical practitioner, who is able to give any certificates required under the Education Acts.

BANKRUPTCY AND MEDICAL OFFICERSHIP OF HEALTH.

OMEGA asks whether a bankrupt can hold a part-time appointment as medical officer of health to a district.

*** A bankrupt cannot during his bankruptcy, or until five years after his discharge, act as a member of the legislature, or as justice of peace, mayor, alderman, councillor, guardian, or overseer of the poor, member of a sanitary authority, school, highway, or burial board, or select vestry in any part of the United Kingdom, but is not prevented from holding other offices.

FEES TO MEDICAL WITNESSES.

W. M. M. complains that he was absent at the Carnarvon Assizes under a subpoena for seven days to give evidence touching an accident, which he had witnessed. His residence is in Durham, and he was compelled to engage a locumtenent during his absence, and he has only been allowed £15 19s. for expenses. He does not think this sufficient, and is applying to the taxing master for a more liberal allowance. He wishes to know the customary items of expense usually allowed in cases of this kind.

*** Two guineas a day and travelling expenses is, we believe, the customary allowance for a professional witness at the assize courts when residing at a distance therefrom.

DOCTORS AND NURSING CLUBS.

L. N. H.—A correspondent writes that he is often called in to maternity cases by a nurse who is employed by a "nursing club." He is frequently unable to get any fees for his services, and has applied to the said club for a guarantee that his fees shall be paid in such cases. This has been refused. What is his position?

*** Unless willing to take his chance of getting paid, our correspondent's only remedy is to refuse to attend to such cases without a previous guarantee of payment. Unless a fee is guaranteed by a local authority, where the patient is not in a position to pay a doctor, recourse should be had to the relieving officer, who can call upon the district medical officer to attend. The latter will be entitled to a fee of £2 in most cases where there is any special difficulty.

BOND IN RESTRICTION OF PRACTICE.

A CORRESPONDENT writes that he has been a nominal partner of his principal for one year, and that he has signed a bond not to practise independently within ten miles of the city where his principal resides. In the practice is a large club, which the members desire to put in the hands of a doctor who is to do no other work, and he has been more than once asked to take this appointment; but the principal objects, and insists on the observance of the bond. As the latter only prohibits practice "in opposition" to the principal, our correspondent asks if the holding of a club which forbade private practice would violate this clause. Secondly, he wishes to know whether the following would be contrary to the ethics of medical practice: He has discovered a special disinfectant, which has become very popular. Can he make an arrangement with a chemist to prepare this article and sell it, and account to him for the profits?

*** (1) It is to be feared that under his bond our correspondent would be prevented from accepting this post without the leave of his principal. As the club might attract many of his old principal's patients, especially if he were the doctor, it could hardly be contended that he was not practising in opposition to him. (2) Such a procedure would be altogether unprofessional.

NOTIFICATION OF STILLBIRTHS.

A CORRESPONDENT writes that he has recently had two stillbirths in his practice, and "when going to supply the usual certificate, found he was out of forms." He sent to the registrar for a book of forms, but after failing to get one, he wrote out the certificates upon ordinary note paper. These were refused at the cemetery, and the burial was not permitted till the certificates were furnished on a proper form.

*** Our correspondent's statement is somewhat puzzling. A death certificate for a stillbirth is not required by law, as it is not necessary to register such, although, under the Notification of Births Act, a notification of all stillbirths, if after the twenty-eighth week of pregnancy, must be sent to the medical officer of health of the district. It is usual for the practitioner to give some kind of certificate to the undertaker in cases of stillbirth, but not to fill the ordinary official death certificate form. In the case of burials, the cemetery officials require a certificate that the death has been duly registered according to law, but not a death certificate in the medical sense. This cannot apply where there has been no live birth.

Medico-Ethical.

The advice given in this column for the assistance of members is based on medico-ethical principles generally recognized by the profession, but must not be taken as representing direct findings of the Central Ethical Committee, except when so stated.

INDIRECT ADVERTISING.

SPECIALIST writes: There is a form of indirect advertising which is gradually finding its way into professional life, and of which, so far as I have seen, no notice has been taken. One or two enterprising opticians have secured the services of gentlemen whom they consider as qualified ophthalmic surgeons, and these practitioners attend at certain hours in the opticians' shops to interview patients. Like their neighbours, these opticians advertise enormously; indeed, a large part of their work, no doubt, comes to them through numerous advertisements scattered widely over the country. When a practitioner consults in the shop of an optician who thus advertises largely, does he in any way make himself amenable to the penal code of the General Medical Council? If not, why not? One ingenious individual extensively advertised that when he failed to suit a patient himself he was in the habit of "recommending an experienced and skilful oculist." A medical practitioner as an experiment sent a number of his patients to that shop to find out about the said "oculist."

They were all recommended to a young gentleman who had just commenced ophthalmic practice in that neighbourhood, and who, no doubt, had his rooms filled in consequence.

*** We referred to this in the second part of our answer to "G. P." in the JOURNAL of November 5th. We have no doubt that medical practitioners should not be allowed to avail themselves of this form of indirect advertising, and that the General Medical Council would listen to any complaint properly supported by evidence.

MEDICAL PARTNERSHIPS.

WE have frequently pointed out the great advantages conferred by partnership upon medical practitioners, and have deplored the fact that they are not more common, or, when they exist, work badly, owing to the unwillingness of one of the partners to fulfil loyally the obligations of his position. A correspondent writes us a letter which illustrates the difficulties which may arise, and we summarize his complaint, premising that we have had no opportunity of testing the accuracy of his statements. He says he is a junior man who has purchased a share of a practice from a gentleman who wished to live out of town. He apparently lives at the former residence of his senior partner, and is in communication with him by telephone. He complains that during the six months he has been in partnership he has not been introduced to any patients, and that his senior partner does not speak of him as his partner, but as "some one who is working with him." No notice has been sent to any of the patients that he has taken a partner, nor did his name appear upon the billheads when the midsummer accounts were sent out. The maid who attends to the door and the telephone, and who has been eleven years in the service of the doctor, sends patients away if the senior partner is not at home, and does not mention our correspondent's name. When he asks to see or do anything, the senior partner tells him that things are all right and the practice is keeping up to the average, and that in time our correspondent will be able to make a practice of his own. If he does see a patient, his senior invariably alters the treatment without speaking to him, and if he visits any one outside, his senior calls to see the patient without letting him know that he has done so. He complains that no proper books are kept, and that he has no access to the visiting list, and no means of finding out what is being done; also that his partner is late in his attendance in his consulting hours, and that patients to see him are kept waiting or sent away! Finally, that the maid goes to bed at 10 p.m., and that it is his duty to answer the telephone and night bell until 8 a.m., when she gets up! He says he likes the neighbourhood and does not want to quarrel over the matter, but would be very glad for our advice.

We think our correspondent has been too long suffering, and he ought, without delay, to have a friendly explanation, in which he should set out exactly what changes he wishes, and what he desires to have done. We assume he has a copy of the partnership agreement; if he does not understand it he had better consult a solicitor, and know exactly what his rights are before he enters upon any discussion, for he will be able to state his case with much more resolution if he knows beforehand exactly what he has a plain right to ask. We may add that the longer he tolerates the existence of the conditions of which he complains, the more difficult he will find it to approach his partner with a view to getting them altered.

MEDICAL APPOINTMENTS BY POPULAR ELECTION.

A CORRESPONDENT sends us a cutting from the *Glasgow Evening Citizen* of October 27th which gives an account of the lively election then going on for the post of Medical Officer for the Seafield, Deans, and Livingstone district, the appointment being apparently in the gift of the workmen employed by the Pumpherston Oil Company. Four candidates were in the field, and we are informed that "a political election is as nothing to the keenness of the contest." Each doctor has his supporters, and a door-to-door canvass has taken place: meetings have also been addressed by the doctors. At one of the meetings three of the candidates met and there was some "plain speaking as to their respective ability to fill the post." The first vote had been taken but had not resulted in any candidate receiving a decisive majority, so that a final vote had to be taken on that day. The paragraph ends: "One of the candidates will address three public meetings to-day in favour of his candidature; the workmen are greatly enjoying the election"!

It is highly undesirable that medical appointments should be made in this fashion. The whole proceeding is unwise, as it is by no means likely to secure the appointment of the best man. No doubt exercise of the privilege of voting is popular, and the present would be an undesirable time to attempt any reform; but when the excitement of the election is over an attempt should be made by the medical profession in the district to come to some arrangement with the leaders of the men, so that the choice should in future be left to an election committee appointed by them. The best body to initiate such a reform would be the local Division of the Association, to whose attention we commend the matter.

MEDICAL ADVERTISING.

RICHMOND.—We do not think our correspondent's proposal is one which he would be well advised to carry out, as it comes into the same category as the putting up of name-plates on houses where there is no bona fide tenancy—a procedure of which we have frequently expressed our disapproval.

Obituary.

EDWARD ELDRIDGE BLOMFIELD, M.D.LOND.,

LECTURER ON MATERIA MEDICA, UNIVERSITY OF OTAGO.

DR. EDWARD BLOMFIELD, of Dunedin, died on October 15th in New Zealand. He had been absent from England for a good many years, but not so long as to be forgotten by his many friends in Yorkshire and old fellow-students at the London Hospital. Dr. Blomfield, who was in his 48th year, was born at Hastings, his father being the Rev. H. Blomfield. His general education he received at the University School, Hastings, and as one of its pupils he passed the matriculation of the London University at the age of 16, and in the first division.

He was not at this time intended for the profession of medicine, and on leaving school was entered at the London and County Bank as a clerk. In view, however, of his intellectual ability and aptitude for scientific work, it was natural that he should not find a bank clerk's occupation much to his taste, and after a year or two gave it up on obtaining an appointment in the Government Laboratory at Somerset House. While there he began a definite study of science, and was so successful that before long he competed for the Entrance Scholarship in Science at the London Hospital, and carried it off.

His career as a medical student, thus happily begun, proved one of much distinction. Apart from minor prizes he carried off in consecutive years the scholarships in Anatomy and Physiology, and in Anatomy, Physiology, and Chemistry; and before leaving the school in 1891 was awarded the scholarship in Obstetrics. At university examinations he was equally successful, taking first class honours in Chemistry at the Intermediate M.B. in 1889, and honours in Medicine and Forensic Medicine at the Final M.B., B.S. examination in 1891. The joint diplomas of the two Royal Colleges in London he received in the same year, and proceeded four years later to the M.D. degree of his university.

On leaving the London Hospital he joined his brother, Dr. G. W. Blomfield, in practice at Pontefract, remaining with him until 1894, when he moved to Knottingley, not far off, as the successor of Dr. Johnson of that town. His stay in Knottingley was not long. He had always had a desire to settle abroad, and in 1899 an opportunity for doing so presented itself. The University of Otago was in search of a lecturer on materia medica, and on applying for the appointment he received it and went out forthwith. His life in New Zealand was a happy one; he was successful both as a trainer of students and as a private practitioner, and just as had been the case in England his genial disposition, pleasant manners, and real kindness of heart secured for him a wide circle of friends. At the time of his death he had been married six years, his wife being a New Zealand lady, and he has left behind him a widow and two children.

ALEXANDER MILNE, M.B., C.M.ABERD.,

ILKLEY.

WE regret to record the death on October 26th of Dr. Alexander Milne, of The Grove, Ilkley, Yorkshire. It took place at Huntley, N.B., where Dr. Milne had been staying for some time past, and was due to malignant disease.

Dr. Milne, who commenced his medical education at the University of Aberdeen, completed it at Guy's Hospital and in Dublin, and in 1885 graduated M.B., C.M.Aberdeen, with highest honours. Before settling down in practice he served two terms of office as a resident in institutions, his first post being that of Resident Medical Officer at the Hospital of Consumption in Manchester, and his next that of House-Surgeon at the District General Infirmary, Dewsbury. He then acquired knowledge of practice by work as an assistant, and eventually set up in practice on his own account in Sheffield. The life of a medical man

in a large town did not, however, prove congenial to his tastes, and consequently he accepted an invitation made to him to join as a partner one of the medical men whom he had previously assisted. It proved a happy arrangement for all parties, for he soon acquired an excellent position professionally, made many friends, and was regarded throughout the district with both affection and respect. At the time of his death he was Honorary Medical Officer of the Coronation Hospital, and Surgeon of the North Eastern and Midland railways, and so long as he was fit for duty had shared with his partner the labours of several other appointments.

In private life he was an abstemious man and an advocate of the strenuous life, who combined love of outdoor occupations with an instinct for books; he was thus ever a well occupied man. He was also, though of retiring disposition, an excellent companion, for he was a good shot and proficient at tennis, cycling, golfing and billiards. His death was not unexpected, but is nevertheless the cause of deep regret and a real loss to the Wharfedale district of Yorkshire.

CHARLES EDWARD ADAMS, M.B, B.Sc Lond., M.R.C.S.Eng.

Dr. C. E. Adams, whose death occurred at Buckhurst Hill after a long and painful illness, was only 49 years of age. He settled in Buckhurst Hill in 1885, the same year in which he qualified. He was a man of deep sympathies, and never spared himself in the discharge of his duty to his numerous patients. Of a retiring nature, he never busied himself with public affairs. He won for himself a reputation as an able diagnostician and a sound clinician amongst his brethren in the district where he practised. In recent years he had taken a leading part in the movement to provide a new and efficient hospital for the neighbourhood. Unhappily he has not lived to see the completion of this scheme. He was an accomplished musician, and, what is unusual in an amateur, his talent lay in composition. For many years he was the conductor of the musical society and the president of the choral society. During his twenty-five years of active life at Buckhurst Hill he endeared himself to all classes and denominations by his sweet gentleness and never-failing courtesy. He was an ideal practitioner, combining the courtliness of the older generation with the keener scientific desire for accuracy of the later school.

Dr. de Forest Willard, Professor of Orthopaedic Surgery in the University of Philadelphia, died on October 14th, in the 65th year of his age.

The death at Nottingham is announced of Surgeon-Colonel Chamney Graves Irwin, M.D., late of the Army Medical Staff, in the 80th year of his age. He was educated at Dublin, qualified as a Member of the Royal College of Surgeons of England in 1853, and joined the Army Medical Department as an Assistant Surgeon in 1854, retiring from the service in 1891 with the rank of Deputy Surgeon-General. He served in the Crimea, and was present at the battle of the Alma and at the siege and fall of Sebastopol, for which he received a medal with two clasps and the Turkish medal.

The Services.

VOLUNTARY AID DETACHMENTS.

The Right Hon. R. B. Haldane, Secretary of State for War, delivered an address on Red Cross work to the Scottish Branch of the British Red Cross Society on October 26th. He outlined the work of the Voluntary Aid Detachments and showed the improvement in organization between the medical service of the Territorial Force and that of its predecessor the Volunteer Force. In speaking to a resolution to support the Scottish Branch, Sir George Beatson said that the Lowland Division was thoroughly organized with its regimental medical officers and regimental bearers, its three field ambulances and three general hospitals. As regarded the general hospital in Edinburgh, he expressed the opinion that if the service had a suitable building, and was called upon, it would be ready within from twenty-four to thirty-six hours to take in 530 wounded. They had not got quite so far in the two Glasgow hospitals. They had the staff, nurses, and trained nucleus. They had not settled upon the buildings, but were busy at it, and would soon bring that matter to a conclusion.

TECHNICAL TRAINING IN THE SCOTTISH COMMAND.

The syllabus of technical training for Royal Army Medical Corps, Regulars, and Territorials, issued from Scottish Command Head Quarters on November 1st, includes two series of special lectures. These will be delivered on December 2nd, December 16th, January 20th, and February 17th; the first series, for officers of all arms, at 11.30 a.m. in the Carlton Hotel, Edinburgh; and the second series, for medical officers, at 3 p.m. on the same dates, in the Military Hospital, Edinburgh Castle. A special R.A.M.C. staff tour will take place in spring.

Particulars are also issued regarding the instruction to be given in sanitation throughout the Scottish Command.

GLASGOW UNITS, TERRITORIAL FORCE.

At a general meeting of officers of the five Glasgow units of the R.A.M.C.(T.F.), Lieutenant-Colonel W. F. Somerville presiding, it was decided that the annual gathering of the combined units should take the form of a dance in St. Andrew's Halls during the month of January, and a committee of officers and non-commissioned officers was appointed to make the necessary arrangements. The prize distribution will take place during the evening. The competitions in connexion with the Mounted Brigade Field Ambulance and 1st Lowland Field Ambulance took place at camp. The 2nd Lowland Field Ambulance conduct their competitions during the present month.

LOWLAND MOUNTED BRIGADE FIELD AMBULANCE.

There was a large attendance of officers and non-commissioned officers at the special lecture under the auspices of this unit on November 1st, when Mr. Alex. Trotter, M.R.C.V.S., Veterinary Surgeon to Glasgow Corporation, gave a lecture and demonstration on the inspection of meat. Lieutenant-Colonel R. T. Halliday presided. On the invitation of Mr. Trotter, it was arranged that a special demonstration, more comprehensive in scope, would take place at the abattoirs in Moore Street on November 19th, at 2 p.m., when a large number of specimens of the various types of meat would be shown. Regimental medical officers will be cordially welcomed at this demonstration.

Universities and Colleges.

UNIVERSITY OF LONDON.

Meeting of the Senate.

A meeting of the Senate was held on October 19th.

Appointment of Medical Officer.

Dr. Edmund Ivens Spriggs, F.R.C.P., has been appointed medical officer to the University for five years from October 19th, 1910.

Reappointment.

Miss Beatrice Edgell, M.A., Ph.D., has been reappointed Demonstrator in Experimental Psychology and Curator of the Apparatus for Examinations in Experimental Psychology in the Physiological Laboratory for the session 1910–11.

UNIVERSITY OF BRISTOL.

The following degrees in the Medical Faculty were conferred at the meeting of Congregation, of which an account has already been published. The various recipients were introduced by the Dean of the Faculty, Professor Fawcett.

M.D.—*H. Devine, M.D.Lond., *A. H. Joseph, M.D.Lond., *W. B. Roue, M.D.Durh.
M.D., B.S.—*W. C. Swayne.
M.S.—C. A. Moore, M.S.Lond.
M.B., B.S.—C. W. J. Brasher, A. L. Flemming, W. W. King, L. A. Moore, L. N. Morris, F. C. Nichols, J. W. Taylor, *W. M. Bergin, M.B., B.S.Lond., *Thomasina G. Prosser, M.B., B.S.Dunelm.; *W. S. V. Stock, M.B., B.S.Lond., *A. J. M. Wright, M.B., B.S. Lond., P. G. Stock.

* Associates of University College admitted *ad eundem*.

UNIVERSITY OF SHEFFIELD.

Appointment.

Mr. Archibald Cuff, F.R.C.S., has been appointed Lecturer on Practical Surgery.

ROYAL COLLEGE OF SURGEONS OF ENGLAND.

The annual meeting of Fellows and Members is to be held on Thursday next week, at 3 p.m., and in anticipation thereof the report of the council is now being circulated. The agenda for the meeting will be obtainable on and after next Monday.

The Last Meeting.

The report begins with a reference to the last annual meeting, at which resolutions were passed: (1) Reaffirming the desirability of Members being granted direct representation on the

council; (2) urging the council to impress upon the Government the necessity of such amendment of the Midwives Act as would secure just remuneration for professional services rendered by medical men under the Act; and (3) asking the council to make an arrangement with the Royal College of Physicians, whereby the two colleges would be incorporated under a new charter, so as to form Royal Colleges or parts of the University of London. After consideration the council decided to take no steps with regard to the representation of Members.

The Midwives Act.

Copies of letters exchanged between the council of the College and the Lord President of the Privy Council on the subject of an amended Act and of the report of the representative of the council on the Central Midwives Board are given. The representative of the council mentions that 26,000 copies of the leaflet relating to the early symptoms and recognition of uterine cancer have been distributed among midwives.

Combination with the University of London.

A report on this subject was drawn up by representatives of the College and of the Royal College of Physicians for submission to the Royal Commission on University Education in London, but after adoption by the council it was referred by the College of Physicians to a committee for further consideration.

Dentistry and Anaesthetics.

The occurrence of the Jubilee of the charter enabling the College to grant a licence in dental surgery, and the dinner by which it was celebrated is recorded. Note is also made of the fact that the bill put forward by the Society of Apothecaries, and which among other things would have enabled it to grant diplomas in dental surgery, was withdrawn. In the same connexion may be mentioned the action of the council in regard to the bill relating to the administration of anaesthetics by holders of the diploma in dental surgery. The council opposed the recommendation of the General Medical Council that dentists should be allowed to administer anaesthetics only for dental operations. The council of the College thought that they also should be allowed to administer such anaesthetics as were open to them, for the purpose of assisting medical practitioners in the performance of ordinary operations.

Blindness.

The council advised the Registrar-General that blindness for census purposes should be subdivided into "blind" and "partially blind"; the former term including persons stone-blind or so blind as to be unable to count fingers in daylight at more than 3 ft. distance, and the latter persons who cannot be educated or earn their living by means of their sight. It also suggested that if only a single heading could be used the meaning of the term "blind" should be defined.

Removal of Members.

During the year the names of four Members of the College were removed from the Register after their erasure from the *Medical Register* by the General Medical Council.

Prizes.

The triennial prize (the John Hunter medal and £50) for 1907-10 was not awarded. The subject for 1910-12 is, "The Anatomy and Physiology of the Pituitary Body, and the Relationship with Disease of its Abnormal and Morbid Conditions." Dissertations must be handed in by December 31st, 1912.

The Jacksonian Prize for the year was awarded to Mr. William Girling Ball. The subject for next year is "The Diseases of the Pancreas, with special reference to their Surgical Treatment."

Note is also made of the award of the honorary gold medal of the College to Dr. Robert Fletcher, M.R.C.S., of Washington, in recognition of his labours in connexion with the *Index Medicus* and the *Index Catalogue* of the Library of the Surgeon-General's Office, Washington.

The King.

Copies of the addresses presented to His Majesty the King and to Queen Alexandra on the occasion of the death of King Edward VII are supplied, and the decision of His Majesty to remain an Honorary Fellow of the College is gratefully recorded.

Finances.

The gross income of the College for the year amounted to £25,551. This represents an increase of £150, despite the fact that there has been a decrease of £480 in the gross receipts from the Conjoint Examination Board in respect of the Membership. The latter has been practically counterbalanced, however, by the increase in the fees received for the Fellowship, the L.D.S., and the D.P.H. In reference to expenditure, it is stated that that on books continues to grow materially; while a sum of £503 has been spent on the installation of the odontological collection entrusted to the College by the Royal Society of Medicine. The net outcome of the year's work is a balance of income over expenditure of £1,827. The cost of leases and freeholds of the four houses in Queen Square on the site of which the new Examination Hall is to be erected has now been paid; the share of the College amounts to £11,600. During the next two or three years the College will have to find almost the same sum for the building of the hall.

Diplomas.

During the year the Diplomas of Membership issued numbered 344, of Fellowship 56, in Dental Surgery 84, and in Public Health 86.

The Council.

On the completion of the last election in July the constitution of the council became as follows: *President:* Mr. Henry T. Butlin. *Vice-Presidents:* Mr. R. Clement Lucas, Mr. C. Mansell Moullin. *Members:* Sir Henry Morris, Bart., Mr. Edmund Owen, Mr. Rickman J. Godlee, Sir W. Watson Cheyne, Bart., C.B., Mr. F. Richardson Cross, Sir A. Pearce Gould, Mr. Clinton T. Dent, Mr. G. H. Makins, C.B., Mr. Frederic Eve, Mr. A. A. Bowlby, C.M.G., Mr. Gilbert Barling, Mr. C. H. Golding-Bird, Mr. W. Bruce Clarke, Mr. C. J. Symonds, Mr. William F. Haslam, Mr. C. B. Lockwood, Mr. W. Arbuthnot Lane, Mr. W. Harrison Cripps, Mr. Bilton Pollard, Mr. C. A. Ballance, M.V.O., Mr. John Bland Sutton.

The Museum.

The body of the report concludes with a lengthy statement relating to the affairs of the museum during the year. It has been one of much activity and has seen many valuable additions to the contents of the museum, and the renumbering and redescription of many of them. During the year the number of visitors was 13,648, more than half this number coming on Friday and Saturday, the two days on which the museum is open to nurses and lady visitors. The number of attendances at the very interesting lectures which have been given during the year by Professor Arthur Keith, conservator of the museum, and Professor S. G. Shattock, pathological curator, is also recorded. For the most part, they seem to have averaged between 40 and 50 at each lecture and demonstration.

The Library.

The section relating to the library includes a long list of recent and ancient works and MSS. which have been presented during the year. On the 274 days that the library was open the number of readers was 10,413.

The report is signed by Mr. Butlin, and concludes with an appendix, giving the results of each of the professional examinations held, statements of accounts, and the names of honorary Fellows, ordinary Fellows, Members, and Licentiates in Dental Surgery who have died during the year.

ROYAL FACULTY OF PHYSICIANS AND SURGEONS OF GLASGOW.

We are requested to state that Fellows and Licentiates of the Royal Faculty of Physicians and Surgeons of Glasgow may, on application to the Registrar of the General Medical Council, have the prefix "royal" added to the title of the Faculty in the entry of their names in the *Medical Register*.

CONJOINT BOARD IN SCOTLAND.

The following candidates have been approved at the examinations indicated:

First College.—K. A. Deodhar, A. N. da Silva, R. J. Patchett, R. McC. Paterson, J. M. Beyers, J. L. Hamilton, A. Sinha, J. K. Venables.

Second College.—D. S. Graham, C. J. B. Inglis, J. Williamson, N. N. Chatterjee, J. B. Donaldson, J. J. O'Connell, J. J. Reynolds, S. A. Faulkner, O. R. Jones.

Third College.—D. Aldridge-Macpherson, W. Ashworth, P. W. Laidler, J. McFarlane, T. Sheehan, E. E. Doyle, S. Jesudason, H. W. McH. Wallace, A. S. Mackenzie, S. Brennan, W. Lessey, S. D. Bridge, A. N. da Silva, E. A. Klein.

Final.—J. F. Morse, J. Nedd, D. J. O'Connell, Emma M. Johnstone, M. Greene, Dulcie E. Williams, T. McEwen, W. B. Gourlay, W. St. J. Cogan, R. E. Harris, F. M. Stewart, B. C. Sen, B. G. Shiroadkar, K. F. P. R. Gover, S. E. A. Acheson, J. W. N. Roberts, J. N. M. Sykes, J. Paxton, B. Flack, U. J. Bourke.

CONJOINT BOARD IN IRELAND.

The following candidates have been approved at the examinations indicated:

Final.—G. F. Allison, A. E. Bedell, O. G. Connell, N. M. Herbert, P. McCartan, L. A. Moran, W. H. Murray, H. R. Tighe.

Third College.—A. J. Best, F. Cassidy, E. P. Dewar, R. F. J. Griffith, J. Kelly, B. Kelly, J. S. Levis, M. Meehan, F. P. McDermott, D. Murphy, A. J. Nelian, H. E. O'Brien, P. J. O'Connell, J. C. O'Farrell, G. Wilson.

In his presidential address before the Bradford Medico-Chirurgical Society, Dr. Mitchell dealt with diagnosis by means of the *x* rays. Fluoroscopy, he pointed out, had the advantage of affording direct view of an object, even if it moved under examination, but it was difficult to observe detail, and the process might be dangerous, owing to the difficulty of cutting off undesirable rays. Skiagraphy, on the other hand, was, with modern instruments, almost instantaneous, and supplied great detail. The disadvantage of having a picture in one plane could be got rid of by stereo-radiography, as also by the projection method, and by taking photographs at different planes at right angles. Difficulties, however, still faced those who could not afford to provide themselves with a series of tubes of different degrees of hardness, and they existed also in all cases in which stout patients had to be examined.

Public Health AND POOR LAW MEDICAL SERVICES.

LOCAL GOVERNMENT BOARD REPORTS.

Brackley Borough and Rural District (by Dr. W. W. E. Fletcher. New Series, No. 26).—No reason is given for the inspection of these districts, which are situated in the county of Buckingham. The population of the borough of Brackley is about 2,500. The proportion of good-class houses is large, and although the working-class dwellings are generally well-built and in good repair there are some in an unhealthy and dilapidated condition. The medical officer of health, Dr. J. S. Fenton, has repeatedly urged the Town Council to take steps to secure their improvement, but thus far very little attention has been paid to his representations. In other respects the council has not been inactive. A good water supply has been provided, though the quantity is still somewhat deficient; watercarriage has been adopted and the collection of house refuse has been undertaken. The principal needs of the town from a sanitary point of view would appear to be the provision of an efficient disinfecting apparatus and hospital accommodation for persons suffering from infectious disease. Nuisances arising from the keeping of pigs and fowls have not been very actively dealt with. Upon the houses in the Brackley Rural District the absence of eaves-spouting is noted even for tiled and slated roofs, with the result that damp houses are common. Some cottages are so constructed that the contents of pail closets or privy middens have to be removed through living rooms. The nuisances inseparable from the conservancy system in which earth is not freely used would seem to be particularly marked in the district. Dr. S. N. Stathers has been medical officer of health for fifteen years and receives a salary of £40 per annum, a sum which can hardly be considered adequate for a district 42,000 acres in extent and with a population of over 7,000 persons. Although Dr. Fletcher expresses the opinion that Dr. Stathers does not devote as much time to his duties as they require, there would seem to be justification for the contention of the latter that he does ample work in return for the remuneration he receives.

Conway Rural and Urban and Llandudno Urban District (by Dr. R. W. Johnstone. New Series, No. 28).—The grounds for this inquiry were outbreaks of typhoid fever in the Conway rural district at the end of 1908 and the beginning of 1909, and in the Conway and Llandudno urban districts in 1909. In September, 1908, an unrecognized case of typhoid fever occurred at a milk farm in the Conway rural district and a well-defined milk outbreak resulted, 28 persons being either directly or indirectly infected. Owing to the prompt measures which were taken, including the removal of the milk trade to another farm, the outbreak came to an end. One of the patients was nursed by her mother who was housekeeper in a milk farm in the Conway urban district. She was removed to the Llandudno isolation hospital, and in spite of the remonstrances of her medical attendant returned to her home in a very weak condition, and before her evening temperature had become normal. Within a fortnight of her return a case of typhoid fever occurred in Llandudno in a house supplied with milk from the farm. Other houses on the same milk round were invaded with the disease, and early in May the farmer himself was taken ill and died from the disease. Between April 1st and June 30th 24 persons were attacked with typhoid fever and 19 of them lived in houses supplied with milk from this farm. Two of the houses were large establishments. One was a boys' school where nearly all those persons who had special opportunities of contracting infection by way of milk were attacked by the fever. At the other establishment, where the household including visitors and staff numbered some 155 persons, 3 out of the 5 members of the staff who had free access to milk were attacked, while the other 2 who escaped did not drink milk except in tea or coffee. There were altogether in the double outbreak 55 cases in 25 houses, and 10 of the patients died.

A HARD WATER SUPPLY.

Dr. James Peacock.—In his work on *Water and Water Supplies* (Rebman), Dr. Thresh writes:

"For washing purposes the superiority of soft water is undoubted. Apart from the use of soap, the detergent qualities of a water containing very little calcareous matter in solution are more marked than in waters containing a large proportion of these substances, but when soap is used all the latter have to be removed before the soap dissolves in the water, and so a certain amount is wasted. The first action of the soap is to soften the water, and that this is a very expensive method can easily be demonstrated. Each degree of hardness removed in the washing process means the waste of 12 lb. of best hard soap per 10,000 gallons of water.

"With a water of 20 degrees of hardness, therefore, 1 lb. of soap is wasted for every 40 gallons used, or, in other words, it costs the user 6d. to 7d. to soften each 100 gallons of such hard water when used for washing purposes. As a matter of fact, the expense is probably much greater, since the insoluble curd adheres to the articles being washed, and requires additional time and labour and soap to remove it."

Medical News.

At the meeting of the Royal Microscopical Society to be held at 20, Hanover Square, W., on November 16th, at 8 p.m., Mr. A. E. Hilton will exhibit specimens of British mycetozoa.

At a general meeting of the Balneological and Climatological Section of the Royal Society of Medicine on October 28th, the new President, Dr. Frederick Gardner, of Bournemouth, delivered an address entitled Air and Water: Is There Anything New Under the Sun? The annual dinner took place the same evening at the Imperial Restaurant, Sir Thomas Barlow and Dr. Bertrand Dawson being the guests of the evening.

The annual dinner of the Royal Free Hospital and School of Medicine for Women will be held at the Trocadero Restaurant, Piccadilly Circus, W., on Wednesday, December 14th, at 6.45 for 7.15 p.m., when Mr. E. W. Roughton, F.R.C.S., will preside. The price of the tickets is 7s. 6d., and applications for them should be sent to the Honorary Secretaries, Dr. A. G. Phear, 47, Weymouth Street, W., and Mr. T. P. Legg, M.S., 139, Harley Street, W., by December 1st.

The next general meeting of the Medico-Psychological Association of Great Britain and Ireland will be held at 11, Chandos Street, W., on November 15th, at 3 p.m. under the presidency of Dr. John Macpherson. Dr. G. H. Savage will read a paper on Insanity and Marriage, and the discussion on the paper by Dr. C. T. Ewart on Eugenics and Degeneracy, which was adjourned from the annual meeting, will take place. The members will dine together at 7 p.m. on the same day at the Café Monico, Piccadilly, W.

At a meeting of the Metropolitan Asylums Board held on November 5th, the Hospitals Committee reported that the metropolitan borough councils had recently been empowered, under an order of the Local Government Board, to provide a supply of antitoxic serum for the poorer inhabitants of their districts, and recommended that application be made to the Local Government Board for powers to enable the managers to supply the councils with antitoxic serum. The recommendation was adopted.

The Le Touquet Golfing Tournament for the professions of the Church, navy, army, law, medicine, and others will be held at Le Touquet, France, during the week-end December 9th to 11th. Play will be as follow: Eighteen holes match play *v.* Bogey under handicap. Class I handicaps 12 and under. Class II handicaps over 12. Players can take out as many cards as they wish. Prizes will be given by the Le Touquet Golf Club. Intending competitors should send names and addresses as soon as possible to L. Eliot Creasy, M.R.C.S., L.R.C.P., 36, Weymouth Street, London, when information concerning vouchers for cheap week-end tickets will be forwarded. By the term "profession" is meant an occupation that properly involves a liberal education or its equivalent, and mental rather than manual labour, especially one of the three so-called learned professions; hence any calling or occupation involving special mental and other attainments or special discipline, as, for instance, editing, acting, engineering, authorship, etc.

The usual monthly meeting of the Executive Committee of the Medical Sickness, Annuity, and Life Assurance Society was held on October 21st, Dr. de Havilland-Hall in the chair. The sickness experience of the society for 1910 has so far been well under the expectation, and there is every reason to anticipate a considerable increase in the funds at the end of this year. The most marked feature of the sickness claim list is the steady growth in the number of what are called chronic cases. To assist medical men who were totally and permanently incapacitated from the practice of their profession was one of the main objects kept in view by the founders of the society when they started in 1884, and no part of the operations of the business have received more serious attention from the committee of management. There are now between forty and fifty members of the Medical Sickness Society who have no hope of ever again doing professional work, and they will draw the sick pay—usually £2 2s. per week—for the rest of their lives. Over £1,000 a year is being paid to these chronic cases, and at each valuation of the business of the society a special reserve is made in respect of them. The ordinary sickness claims are under the expectation both in number and amount, and, when combined with the chronic cases, do not amount to more than was anticipated and provided for when the society was founded. Prospectuses and all further particulars on application to Mr. F. Addiscott, Secretary, Medical Sickness and Accident Society, 33, Chancery Lane, London, W.C.

Letters, Notes, and Answers.

Communications respecting Editorial matters should be addressed to the Editor, 429, Strand, London, W.C.; those concerning business matters, advertisements, non-delivery of the Journal, etc., should be addressed to the Office, 429, Strand, London, W.C.

Telegraphic Address.—The telegraphic address of the EDITOR of the British Medical Journal is *Aitiology, London.* The telegraphic address of the British Medical Journal is *Articulate, London.*

Telephone (National):—
2631, Gerrard, EDITOR, BRITISH MEDICAL JOURNAL.
2630, Gerrard, BRITISH MEDICAL ASSOCIATION.
2634, Gerrard, MEDICAL SECRETARY.

ORIGINAL ARTICLES and LETTERS *forwarded for publication are understood to be offered to the* British Medical Journal *alone unless the contrary be stated.*

Authors desiring reprints of their articles published in the British Medical Journal are requested to communicate with the Office, 429, Strand, W.C., on receipt of proof.

Correspondents who wish notice to be taken of their communications should authenticate them with their names—of course not necessarily for publication.

Correspondents not answered are requested to look at the Notices to Correspondents of the following week.

Manuscripts forwarded to the Office of this Journal cannot under any Circumstances be Returned.

☞ *Queries, answers, and communications relating to subjects to which special departments of the* British Medical Journal *are devoted will be found under their respective headings.*

QUERIES.

H. S. G. would be glad to know the technique used by Dr. Beckton for demonstrating Altmann's granules in tumours.

D. G. D. writes: Can any of your readers tell me where I can find anything on colloids in medicine, and especially on mercury colloid.

Steam would like to know experience of newer steam cars, and how they compare for convenience, etc., with petrol cars for medical men. Inquirer has some knowledge of petrol car, but objects to changes of gear, etc., when starting, and noise of all small single cylinder cars.

Licence Duty on Motor Cars.

F. L. N. inquires whether the use of a medical man's motor car in support of a candidate at a parliamentary election would necessitate payment of the full licence duty.

*** No pronouncement has been made by the licensing authorities in regard to any restriction in the use of cars on which only one half the licence duty has been paid. The requirement of the Act is that the practitioner shall prove to the satisfaction of the commissioner or council by whom the licence is granted that the motor car is kept by him for the purpose of his profession. If the car is in fact kept for the purpose of the profession, this requirement would seem to be met, notwithstanding its occasional and incidental use for the purposes to which a private car may be put.

Licences for Male Servants.

Horseman asks for full information as to licences for male servants and livery. He inquires whether duty is payable on any male servant employed for whole time, whether residing in the house or not; also, what constitutes livery for tax purposes.

*** The licence duty for male servants is chargeable whether livery is worn or not. The definition of "male servant" includes a person employed either wholly or partially in such capacities as butler, footman, page, coachman, chauffeur, groom, stable boy, or help in the stables, gardener, under gardener, gamekeeper, etc., but does not include a servant who, being bona fide employed in some capacity other than these, is occasionally or partially employed in any of these capacities. The term "male servant," moreover, does not include a person who has been bona fide engaged to serve his employer for a portion only of each day, and who does not reside in his employer's house. The duty is, however, payable in respect of a male servant employed for the whole of his time, although not resident in the house. There are certain exemptions in favour of officers of the navy and army, hotel keepers, livery stable keepers, and others.

Date of Expected Confinement.

Exsul Scoticus writes: The following doggerel, which is, I blush to say, entirely my own, has proved during some years a useful mnemonic in reckoning the probable date of expected confinements. It will be found to be absolutely accurate with the exception of leap years, when it is easy to allow for the extra day in any nine months' period that includes February. By its help one can instantly say what date will be 280 days, or 40 weeks, from the beginning of the last menstruation, and according to one's predilection can add to that as many days as one prefers. Personally, I found the pregnancy to end, as a rule, later than the 280th day. Take, then, the first day of last menstruation as the fixed point, and—

> Add *four* to the date for conception in May,
> But for March and for April add *five* to the day,
> (These two are the only five-lettered, remember);
> Put *six* for July, and the same for December,
> The seven months left will require the addition
> Of *seven* to the date to forecast parturition.

For example, say menstruation began on August 10th, go back three months to May, add seven to ten, May 17th will be 280 days. But say menstruation began May 20th, February 24th would be 280 days.

ANSWERS.

M.O.H. and Legion have omitted to enclose their cards.

Dr. H. L. Thorp (Ipswich) writes: In reply to "Thirteen" I have obtained excellent results with salicin gr. xv three times a day.

Plague Outbreaks.

Weston.—There has been no case in which an outbreak of plague has originated in a bacteriological laboratory, or in which any other disease of a contagious order has so originated. Possibly the foundation of the story is that some eleven years ago Dr. Müller, of Vienna, inoculated both himself and his laboratory attendant with plague. They were aware of what had happened, and never left the laboratory. They isolated themselves in one of its rooms, and eventually both died. No other cases followed, either in Vienna or in the laboratory itself. Both might possibly have been saved if it had been recognized at that time that bubonic plague is not contagious.

The Effects of Acids on the Urine.

A. H. G.—Most modern books do not go into the subject in detail, but content themselves with expressing the rule that vegetable and mineral acids increase the acidity of the urine. The subject is treated at length in *The Composition of the Urine*, by Edmund A. Parkes, M.D. (London: J. and A. Churchill. 1860), p. 145.

Foreign Practitioners in Italy.

Dr. G. H.—We published an abstract of the new law relating to practice by foreign medical men in Italy last July, and summarized its contents, so far as they relate to those possessed of British qualifications, in the article on Medical Practitioners Abroad in the Educational Number (September 10th, 1910). The law makes practice in Italy absolutely free to foreign medical men, provided their diplomas or degrees have been obtained in countries between which and Italy reciprocity in the matter of medical qualifications exists. All other foreign medical men are forbidden to practise unless (1) they naturalize as Italian citizens and obtain degrees from Italian universities, or (2) unless they have at the date of the Act been resident in Italy and paid income tax for upwards of two years. In the latter case they are permitted to treat foreigners, but not Italian subjects. As Italian qualifications entitle their holder to admission to the *Register* in Great Britain and Ireland, the requirements of reciprocity are fulfilled, and therefore all medical men possessed of qualifications entitling them to admission to the *Register* in this country stand equally entitled to practise in Italy.

LETTERS, NOTES, ETC.

Fatal Pulmonary Thrombosis: A Correction.

Dr. Ernest Glynn (Liverpool) writes: In the title of the above paper published in the Journal of November 5th, Dr. R. E. Knowles should read Dr. R. O. Knowles. The error was mine.

A Disclaimer.

Mr. Henry Curtis (London, W.) writes: To-day a Harley Street physician informed me that my name had been given to him as a reference, as appearing in the list of medical men consenting to have their portraits painted and displayed in an exhibition about to be opened by *Vanity Fair*. I at once warned my friend that on each of the two occasions on which

I had been approached on the matter in question I had absolutely declined to allow any such portrait to be made or exhibited, regarding the whole thing as being merely a form of self-advertisement and therefore contrary to what is in accordance with the best traditions of our profession. As other friends may have been falsely given my name as a reference, I beg you will insert this disclaimer.

Haemorrhage of the New-born.

Dr. Charles T. Quiller (London) writes: With reference to the notes on these cases by Dr. T. F. Forster (October 22nd) and Dr. T. G. Blackman (November 5th) I see that they were both male children. I would suggest as a possible theory that haemophilia might be the cause. This condition is often overlooked from its rarity, but to me it is ever present, as my first child died in forty-eight hours, and now my only child—a boy of 10 years—is a constant sufferer. The diagnosis in my first case was entirely obscure, until years after symptoms appeared in the second, and directed my attention to haemophilia.

Sahli's Opium Preparation "Omnopon."

In the Journal of October 15th there was published a short account of Ewald's and Gräfenberg's experiences with an opium preparation called in Germany "Pantopon" and in this country "Omnopon." In this article it was reported that Ewald compared the price of a sterilized solution of this preparation with one of morphine, and found that the former costs from two and a half to three times the price of the latter. In the *Berl. klin. Woch.* of October 17th Ewald published a note in which he admits that his remark as to the price of the preparation was erroneous. According to this note pantopon (omnopon) costs 33 pf. per ampoule if bought in a packet of twelve, or 40 pf. if bought in packets of six, while ampoulae of morphine cost 30 pf. each, according to the Royal Prussian Medicine scale of prices. The price charged in this country for a dozen ampoules of omnopon, each containing 1 c.cm. of a 2 per cent. solution, is 3s.

Abba, Father!

Dr. Ainslie Hollis (Hove) writes: The word "Abba," father, which Christ used in His passion, may be regarded as Aramaic, "a language akin to Hebrew," as some correspondents suggest. It is certainly an example of a very old and widespread type of child-name for that parent. These words consist of two syllables, "a-xa," where "a" is an open vowel sound, and "x" is a lingual labial or nasal consonant. The Accadian or Sumerian babe some centuries before scrip was invented (that is, 8,000 B.C. or thereabouts!) probably called his father "adda." Afterwards the ancient Assyrians named that parent "abu" or "aba." The first syllable of such words was originally spoken in all probability during a respiratory intake, and the whole word occupied a complete respiratory cycle. This method of utterance, both difficult and dangerous, especially to interprandial orators, was gradually superseded by out-breathed language. Even now the word "aba," father, is in use among the Arabs; and we find "ama" and "hama," father, in the primitive dialects of New Guinea.[1] Otherwise this form of word has been largely replaced by duplicated syllables of the "ba-ba" type in the child-language of the present day.

St. Paul's "Thorn in the Flesh."

Buxtoniensis writes: Before your correspondence on this curious subject closes I cannot but express what is probably only part of a general regret that so little profitable interest has been taken in it, and so little accomplished in deciding whether the "thorn" was a defect of physical or nervous character. The subject is much more likely to receive help in its elucidation from the medical fraternity than from the whole army of theologians, and its elucidation would do much to determine the mental attitude of St. Paul as to whether he had not passed beyond the confines of hystero-epilepsy into emotional insanity. One or two thoughtful letters like that of Dr. Jones in the Journal of October 15th are what one would naturally look for and appreciate. But half the criticisms have been either irrelevant or simply slaying the slain.

That Aramaic was the language in which the uneducated disciples of Christ must have conversed with each other is probably familiar to every Sunday school scholar, and as Renan, and almost the whole school of German theologians say, Christ did not, and for many cogent reasons could not, have known Greek, has more weight with me personally than the *ipse dixits* of any number of local preachers holding other views.

The same remark applies to the so-called Greek woman, which one of your correspondents relies on as a proof that Christ understood Greek. Does he need to be reminded that at that time the Jews called all civilized nations except themselves Greeks (as Acts, xix, 10; xx, 21; Rom. I, 16; II, 9, 10; x, 12), just as the Greeks called all except themselves Barbarians. Though Mark vii, 26, calls her a Greek, Matthew calls the same woman a Canaanite (xv, 22). The Revised Version more cautiously calls her a *Gentile*, but the text adds she was a Syro-Phoenician, where again the schoolboy will tell us her language was consequently Aramaic.

But another more *bizarre* criticism it is better to leave in the very words of your correspondent: "The most violent higher critic and the most *rabid of the orthodox* (!) agree that Luke's gospel and the Acts were written in Greek." For whatever this stupendous discovery may be worth, it is quite true! They even go further, and the higher criticism which he invokes has now finally decided that Luke and the Acts are by the same hand, but that hand was *not* St. Luke's.

In the Augustan age of Roman literature, when the Roman dominion extended almost over the whole of the ancient world, and it was at the zenith of its power and influence, the same droll correspondent makes the astonishing statement that Greek was the *lingua franca* of the whole world! And he tries to prove that this debased Greek of the New Testament, this Greek of the back kitchen and the street—kitchen-Greek—was the vernacular language of the foremost city of another nation altogether. And this is the humorous proof of it.

"The Roman lady," says he, "liked to be styled Zoe Kai Psyche by her lover. . . . Rome itself was full of Greeks."

Well, London has far more Germans and French and Jews in it than ever ancient Rome had Greeks, but their influence on the vernacular is microscopic. Of course every attractive Roman lady would like to have been called "My life, my soul," or, as it is much more prettily expressed in Byron's "Maid of Athens," "Zoe mou sas agapo!" if she had the good luck to know the meaning of it, which in the great majority of cases she certainly would not, any more than the average London girl would like her lover to drivel over her with a flood of similar endearments, "all equally Greek" to her—"Ma belle aimée, chérie," etc.—and she would probably like it so much as to answer him in the words of Albert Chevalier—"Garn!"

So far from Greek having been in general use at Rome, Juvenal thunders against the higher classes for their aping foreign customs and for indulging in a society craze for Greek, just as every other English dramatist of the seventeenth and eighteenth centuries declaimed against the introduction of French modes of speech and of the flippant and affected immoralities of French milliners and dancing masters.

They were only the modern representatives of these passing fads in society. And so Juvenal—

Omnia Graecè—concumbunt Graecè! and the Rev. Mr. Madan's reflection, "The Roman ladies were guilty of copiously interlarding their vernacular tongue with Greek words, a piece of affectation similar to that with which the British fair have been charged of introducing French phrases upon all occasions."

Professor Ramsay, who, I believe, still has a large following, holds that Paul caught malarial fever while doing missionary work, and subsequently betook himself to the highlands about Antioch, feeling that the more bracing air of the uplands of Asia Minor would enable him to recover more quickly.

At least one objection to this, from a medical point of view, is whether a long and perilous journey like that from Perga to Antioch could be practicable in such an enfeebled state.

An objection none the less difficult is the reconciling this view with the cryptic words in which Paul refers to his bodily imperfection or defect.

"I preached the Gospel," says he, "unto you the former time, and that which was a *temptation* to you in my flesh ye despised not, nor *spat out*" (Gal. iv, 14).

Should this *temptation* in my flesh be read *vexation*, as seems to be justified by the Latin translations of the Scriptures, or does he refer to some ancient usage in which expectoration was indulged?

Krenkel has elaborately discussed the question in his *Beiträge* (pp. 47–125), in which he shows how epilepsy was regarded by the ancients with peculiar horror as a supernatural visitation, often associated with madness (Matt. iv, 24; xvii, 15, with which, also, Paul was taxed (2 Cor. v, 13; xii, 11). Spectators witnessing epileptic attacks used to *spit out* in superstitious dread, and by way of averting the evil (*morbus qui sputatur* of Plautus, Captivi iii, 4-18, and the *despui suetus* of Pliny, Nat. Hist. x, 23).

*** We think this correspondence may now cease.

[1] See *The Languages of New Guinea in the Different Dialects.* By Sydney H. Ray.

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